MECCANO MAGAZINE

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No. 10

OCTOBER 1924

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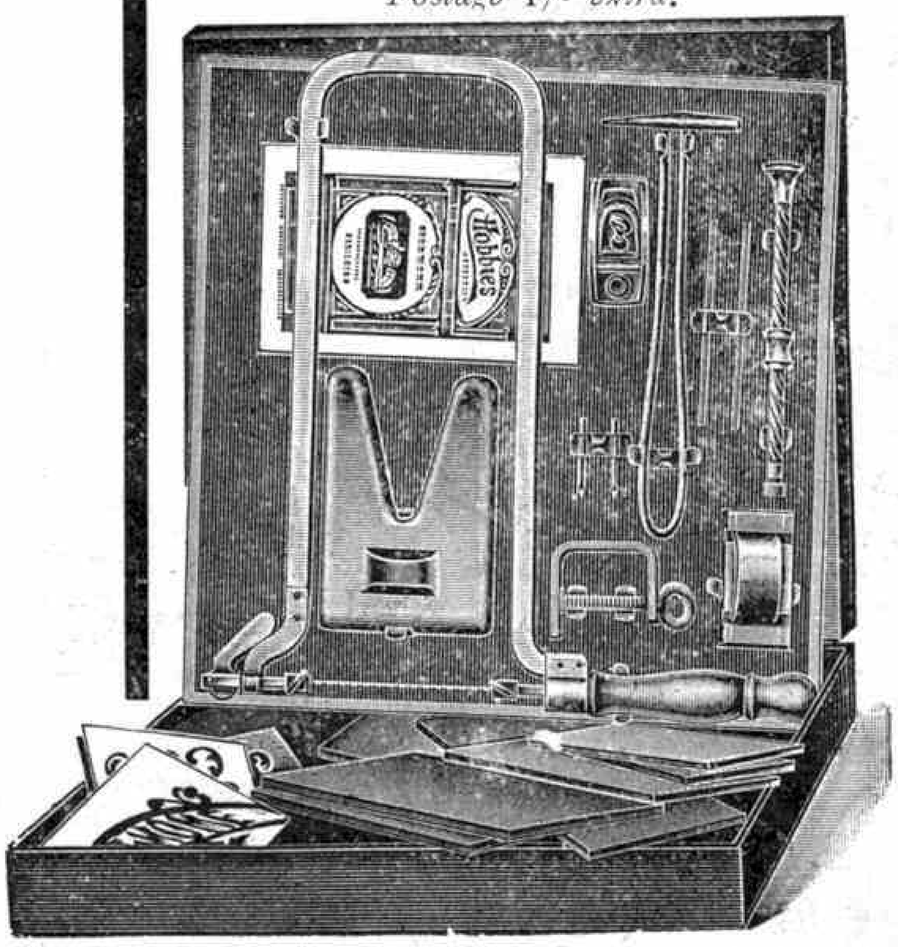
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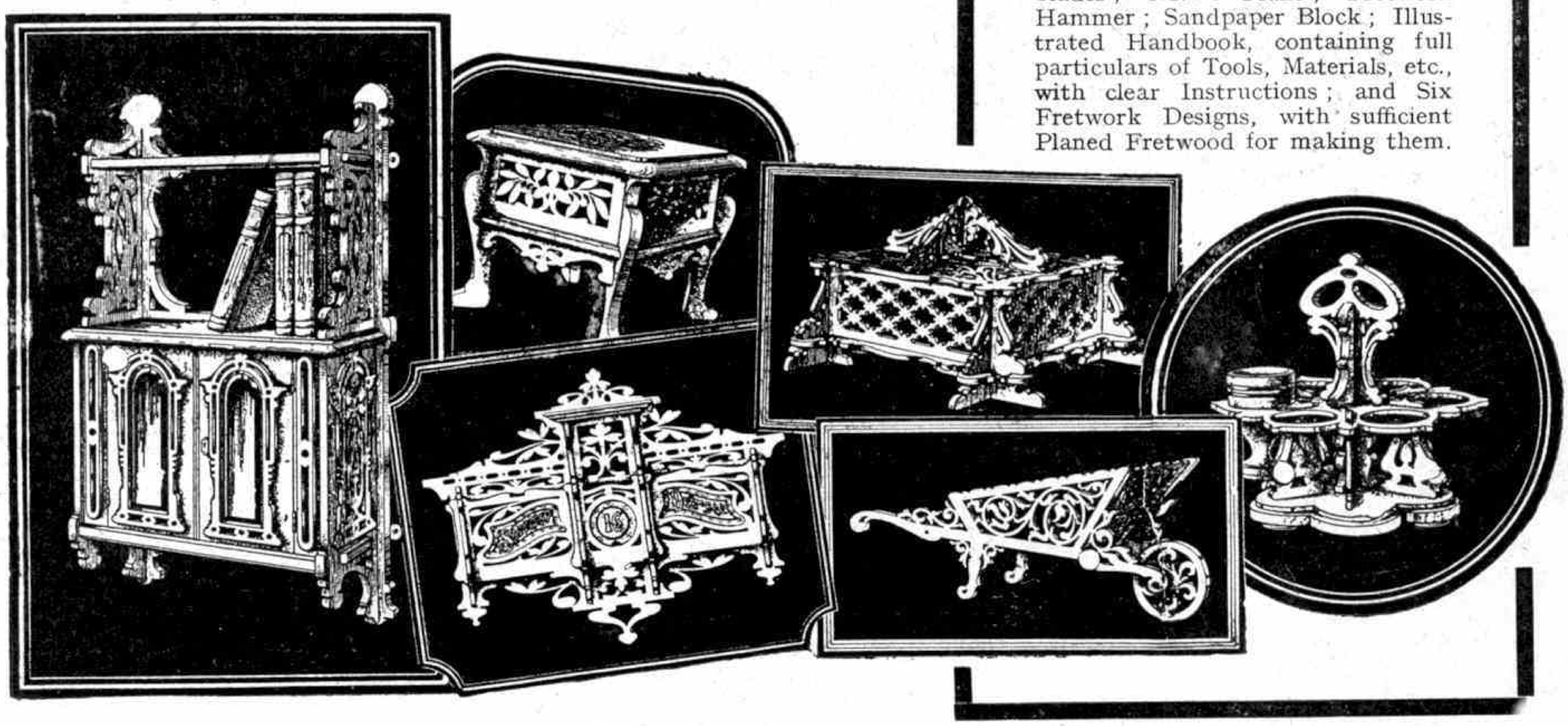


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Our Cover

THIS month our cover illustrates a giant 'steam-shovel at work on the site of the Panama Canal. Steam-shovels, which have made possible the construction of many works, including the Panama and the Manchester Ship Canals, are of great service to the engineer when it is necessary to excavate or remove large quantities of material. The fact that the modern steam-shovel is able to accomplish in a day as much work as 2,000 men could accomplish in the same time with picks and shovels, is a very important consideration for the engineer, enabling him to tackle great undertakings that would be impossible if these mechanical navvies were not employed. In the cutting of the Panama Canal, for instance, over 80 shovels were employed, and as each shovel requires only a few men to look after it, the economy in accommodation and transport of the workmen was very great. A special article on the story of the Panama Canal that I hope to publish in the near future will enable my readers to understand the great debt that civilisation owes to these monster steam-shovels, which, by the way, were fully described in our issues of January and February last.

A Fine Model

On page 284 will be found full instructions for building a Meccano model of one of these wonderful engineering appliances. I have seen one of these models of a steam-shovel at work and can assure my readers that it is one of the finest models that have ever been built in Meccano. It embodies several interesting features—including roller-bearings—and use is made of a new part, the Circular Strip, supplies of which will be available in the near future. This splendid model is most realistic, and I hope as many readers as possible will build it during the coming winter. Incidentally I may here remark that entries for the special Drag-line competition which closed yesterday (30th September) have been received in large numbers, and I hope to announce the result of the contest next month.

A New Feature

In this issue I publish the first of a series of articles on the Hornby Train system. I have no doubt that these articles will have a very enthusiastic reception, for during the past twelve months I have received hundreds of letters from readers in almost every part of the world asking for something on these lines. The object of these articles is to indicate how to obtain the most fun from a Hornby set. Among other things they will show how complete railway-like layouts may be built up from the various components of the Hornby Train system. Every month this comes closer to perfection. New accessories are continually being added to the large number already in existence, and the system is steadily developing on the same sound lines as those on which the Meccano system has developed. The first article deals principally with the various types of locos and their mechanism, and future instalments will review the whole system step by step. Having prepared the ground, as it were, different types of track-layouts will be illustrated and described, with full details showing how to make the best use of points and crossings, signals, etc., and suggested schemes of working to a time schedule.

Engineering on the Moors

Last month I spent a very enjoyable holiday in a walking tour on the Yorkshire Moors. I did not expect to find any traces of engineering and similar works in such a lonely place, and you may imagine, therefore, how surprised I was to come across evidence of a wonderful engineering feat amid the heather and the bracken. This was a Roman road, lying between Levisham and Goathland and recently uncovered by the Government Department that is charged with the preservation of our ancient buildings, monuments, and the like. The road, which has been uncovered for a distance of 1¼ miles, is 16 ft. in width and consists of large flat pieces of stone. Probably the top surface has been removed and these stones were the foundation of the old road. However that may be, the road to-day resembles a huge "crazy-pavement" such as is laid down in old-world gardens. It is believed that the road was made by the soldiers of the VIth Legion, who were stationed at York and were famous for works of this kind. As I walked the length of the road I could not help thinking of the wonderful engineering ability of those Roman soldiers, who were able to construct such fine roads all over the country and so keep this country in subjection, hundreds of years ago. I could almost see the Roman soldiers marching along this road across the moors—which were there in their time—on their way to relieve the garrison on the great Roman wall, built, you will remember, to hold the inhabitants of Scotland in check. Another link with engineering, not far distant from the old road, was an old iron mine and iron works, now closed down but at one time the centre of a thriving industry. Close to it was a curious railway, one of the first of its kind and built about the same time that Stephenson opened the Stockton and Darlington line. On this moorland railway the trains were hauled by horses, and it was not until several years later that the steam engine was employed here, as the farmers and dwellers on the moorland naturally preferred horses to the newly-invented steam engines, which they could not understand.

A Nature Study Page

I saw many other interesting things on my walk, which, however, were not connected with engineering. At one place, for instance, there were some 60 bee-hives that had been brought on to the moors in order that the bees might gather heather-honey for their owners. As a rule bee-hives contain over 50,000 bees, so my readers will easily understand that the air was literally full of flying bees, and that the humming of their wings could be heard from a considerable distance. There were butterflies and moths innumerable, flying about the heather, and numbers of the fine green caterpillars of the Emperor Moth, measuring over three inches in length and decorated with orange and mauve spots. I brought some of these home with me and also several specimens of the wonderful "Sun-Dew," the plant that catches and "eats" flies and other small insects. Some day I hope to be able to describe some of these marvellous things in our Nature Study page, for which there has been an increasingly insistent demand during the past few months.

Next Month:

FAMOUS ENGINEERS:—
Telford.

ELECTRIC BELLS, INDICATORS AND BURGLAR ALARMS

SOME RECENTLY-ISSUED STAMPS

NEW MECCANO MODEL:—
Boat-Launching Gear

A WONDERFUL NEW COALER, etc.

COMPETITIONS, GUILD NEWS, CYCLING NOTES, PUZZLES, and other regular features



IX. JAMES BRINDLEY: The First English Canal Engineer

In our last two issues we gave details of Brindley's early life, when he was apprenticed to a millwright, and of his great work in the construction of the Bridgewater Canal from Worsley to Manchester. Brindley, although a self-taught man and the son of a crofter, had a remarkable genius for canal construction. He was also possessed of the dogged determination that is so necessary a quality in the successful engineer.

THE Duke's first canal aroused no opposition, but his proposed canal to connect Manchester with the Mersey met with considerable hostility. Its chief opponents were the proprietors of the Mersey and Irwell Navigation, who saw that this proposed canal seriously threatened their monopoly, for so long as they owned the only waterway they could charge what rates they liked.

At first the Navigation tried to buy off the Duke by concessions. They offered to make a great reduction in their rates for coal and other materials, conveyed upon the Irwell between Barton and Manchester, if he would arrange for his canal to join their Navigation at Barton and abandon the portion of his canal between there and Manchester. When this offer was rejected they offered him exclusive advantages in the use of their Navigation, but all to no purpose, for the Duke was determined to go on with his scheme.

The Navigation proprietors had many influential supporters, but they had made themselves unpopular by extorting the highest possible rates for transport and by their high-handed methods. On the other hand, the Duke's scheme was supported by a number of petitions from those who had suffered from the Navigation monopoly.

A Novel Demonstration

A Parliamentary Committee was appointed to investigate the Duke's scheme, and Brindley had to go up to London to appear before the Committee. Unfortunately there is no record of Brindley's evidence, but some amusing stories are told of him on other occasions. For instance, when he was asked for a drawing of a proposed bridge, he replied that he had no plan on paper, but he could illustrate it by a model. He then went out and bought a large cheese, and on his return to the room he cut the cheese into equal parts, saying "Here is my model" The two halves of the cheese represented the semi-circular arches of the bridge, and by laying over them a long rectangular object he was able to demonstrate to the Committee the position of the river flowing below the bridge and the canal passing over it.

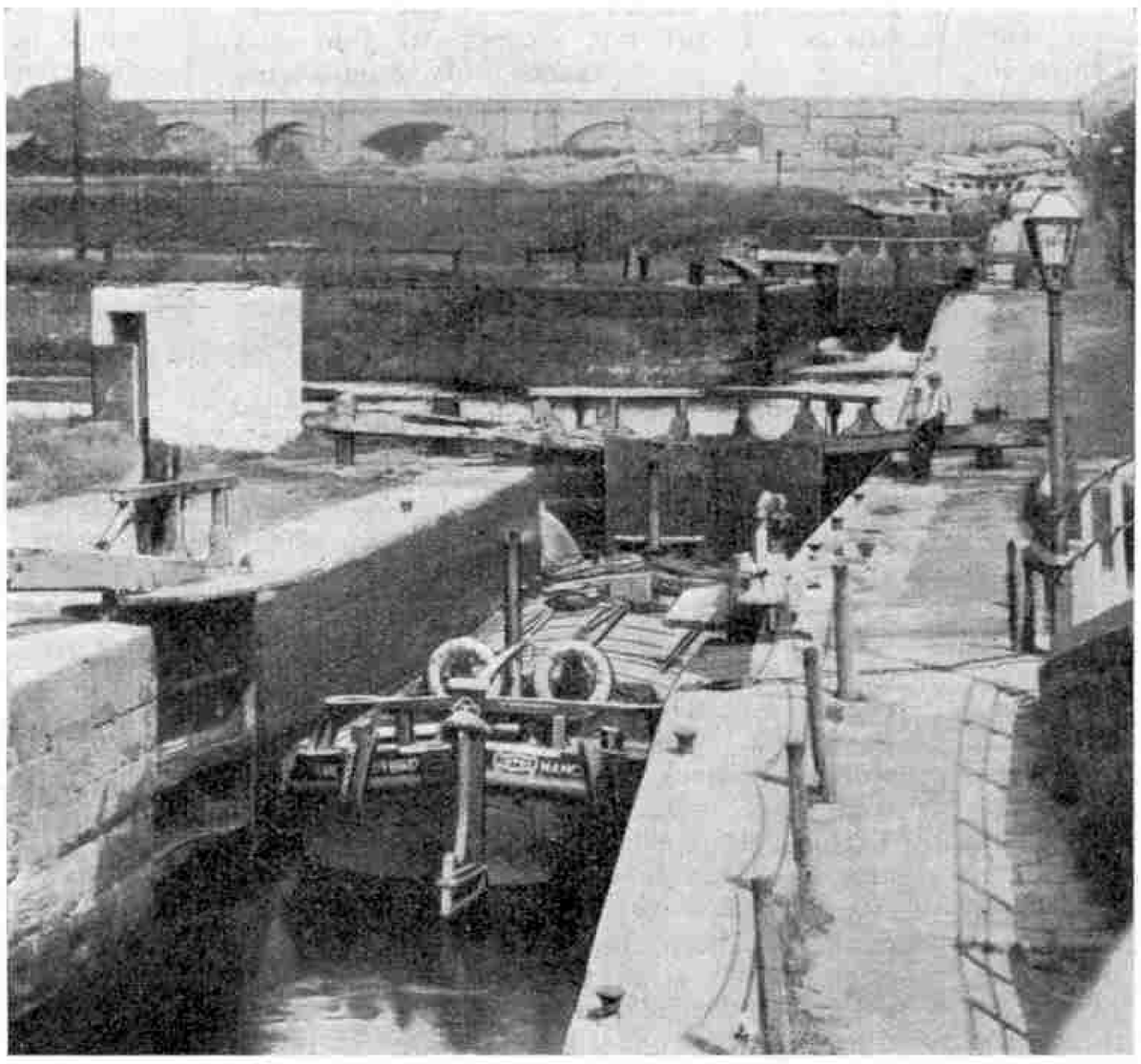
On another occasion, before a Committee of the House of Lords, a Peer asked him to explain the working of a lock. Brindley promptly produced a piece of chalk and made things quite clear by drawing diagrams on the floor! He was always ready with a piece of chalk to illustrate his arguments, and it became a common saying in Lancashire that "Brindley and chalk would go through the world."

In spite of all opposition the Bill for the Duke's canal was passed, and it received the Royal Assent on 4th March, 1762.

Brindley Encounters Difficulties

The canal between Worsley and Manchester, although a very bold scheme for its period, had presented few engineering difficulties. The new canal to the Mersey was a very different affair, however, and its course of about 24 miles bristled with difficulties, including the crossing of brooks, rivers, and bogs. The worst bog to be crossed was Sale Moor, where the bottom was of quicksand. The construction of the canal at that point was probably almost as formidable an undertaking as the laying of George Stephenson's railway over Chat Moss, some 60 years later. As was the case with Stephenson, Brindley regarded difficulties merely as obstacles to be overcome, and he never relaxed his grip on them until they were surmounted.

George Stephenson made a practice of securing a level track for his railways whenever possible, and in the same manner Brindley aimed at securing long, uninterrupted, level stretches of water in his canals. Brindley's idea was to construct a level of dead water all the way from Manchester to a point as near the Mersey as possible, and to concentrate all his locks near Runcorn where the canal descended to the Mersey. Locks provide a means of raising or lowering boats from one stretch of a canal to another stretch at a different level. Their working is extremely interesting, but as we have not sufficient space here to deal with the subject adequately, we intend to devote a special article to it in a subsequent issue of the "*M.M.*"



The Flight of Locks at Runcorn

An Embankment Problem Solved

The new works began at Longford Bridge, from where the canal was carried across the valley of the Mersey upon an embankment about a mile in extent. The conveying of the great quantities of earth required to form this embankment was a big problem, and the manner in which Brindley dealt with it was another instance of his great engineering ability and ingenuity.

He had the material brought in special twin boats from other parts of the canal where there was an excess owing to extensive cutting. These twin boats were fixed side by side about two feet apart, and between them was carried a triangular trough capable of containing some 17 tons of

earth. The bottom of this trough was arranged to open on the withdrawal of a pin. When the boats arrived at their destination they were conducted from the canal into water-tight caissons placed at the point over which the earth had to be deposited. The trough pin was then withdrawn and the material was discharged in an instant. To carry out this work by road would have occupied all the horses and carts in the neighbourhood for years.

The work of construction went on very rapidly, between 400 and 600 men being regularly employed. Brindley himself, judging from the entries in his notebooks, appears to have almost lived on the works.

The cost of the undertaking was, of course, very great, and after a while the Duke found himself in difficulties about money. Fortunately, however, he was able to borrow a sufficient amount from a London bank to carry on the works. The entire level length of the canal to the upper part of Runcorn was finished and opened for traffic in 1767, five years after the passing of the Act, but the long flight of locks down to the Mersey was not completed until several years later, by which time the Duke's receipts from the sale of his coal had restored his financial position.

Opening of Runcorn Locks

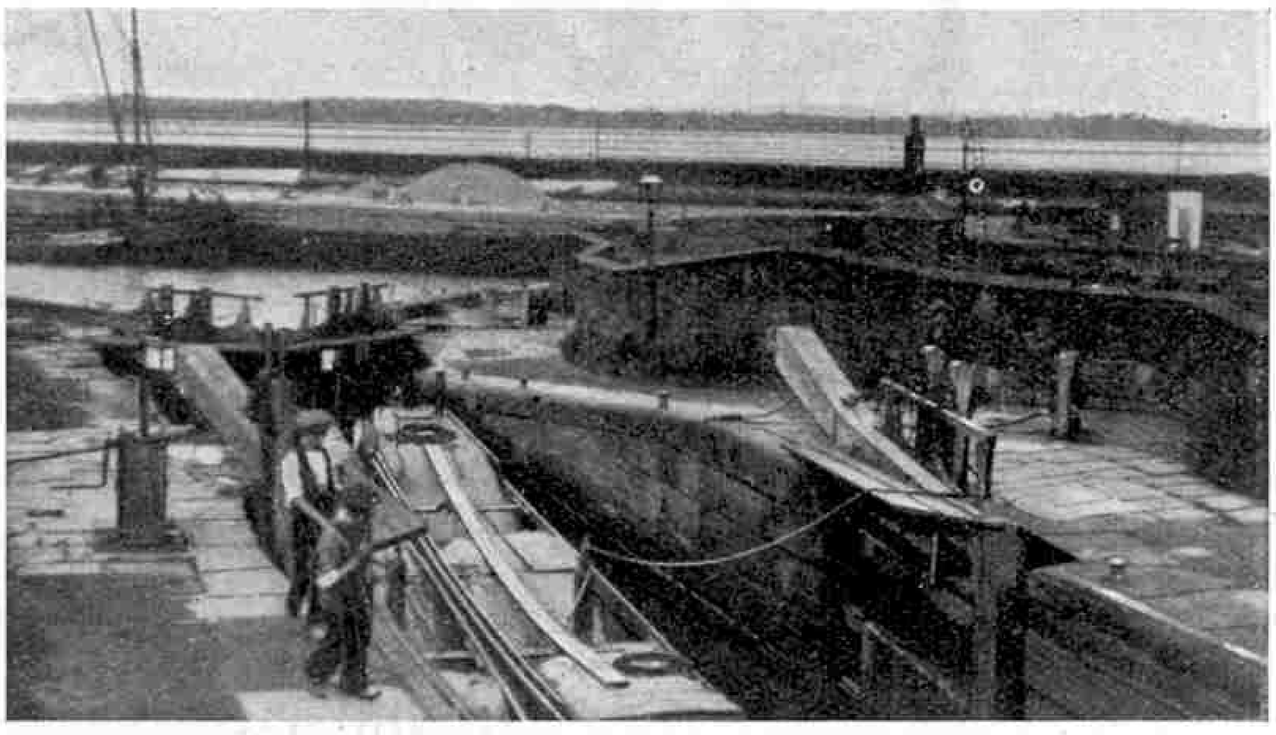
A letter written from Runcorn on 1st January, 1773, says: "Yesterday the locks were opened and the '*Heart of Oak*,' a vessel of 50 tons burden, for Liverpool, passed through them. This day upwards of 600 of his Grace's workmen were entertained upon the lock banks with an ox roasted whole and plenty of good liquor. The Duke's health and many other toasts were drunk with the loudest acclamations by the multitude who crowded from all parts of the country to be spectators of this astonishing work."

The total cost of completing the canal from Worsley to Manchester and the canal to the Mersey amounted to £220,000. To us to-day it appears an astonishing fact that this great canal undertaking, which ultimately produced an income of £80,000 a year, was planned and carried out by Brindley at a rate of pay very much lower than that of an ordinary mechanic of the present day!

The Barton Aqueduct To-day

The Duke of Bridgewater died in 1803, and his canal was worked by trustees until 1889, when the Manchester Ship Canal Co. bought it. Since that time Brindley's aqueduct has been replaced by one of the most remarkable engineering structures in the world. This is a steel aqueduct capable of holding a section of the water of the canal, along with any boats that may happen to be on it at the time. The section is closed and the water held in it by means of lock gates at each end so that when desired it may be swung clear of large ships that are passing along the canal beneath. This wonderful aqueduct was illustrated in our last issue.

While the canal to the Mersey was under construction, Brindley made surveys for a proposed canal to pass through Cheshire and Staffordshire, to open up communication between the Mersey and the Trent, and between both these rivers and the Severn.



A boat in the Lock, descending to the river

Difficult Transport in Potteries

The earthenware industry in Staffordshire had already made considerable progress, but it was seriously hampered by transport difficulties, as was also the salt trade in Cheshire. At that time the Staffordshire roads were barely passable by wagons in summer, and scarcely passable at all in winter, even by packhorses. The chief materials used in the making of pottery came from a great distance. The flints were brought from the south-eastern ports of England by sea to Hull, and from there up the River Trent to Willington. The clay came from Cornwall and Devonshire and had two possible routes. Most of it came by sea to Liverpool and up the River Weaver to Winsford in Cheshire; the remainder was brought from Bristol up the River Severn to Bridgnorth and Bewdley. The last-mentioned place on each of these routes was the farthest point to which flint or clay could be brought by water, and the remainder of the journey in each case had to be made by road.

The manufactured articles were distributed by similar means. The pottery had to be carried by road in crates slung across horses' backs, and in addition to the high cost of transport there was a great risk of loss by breakage or theft.

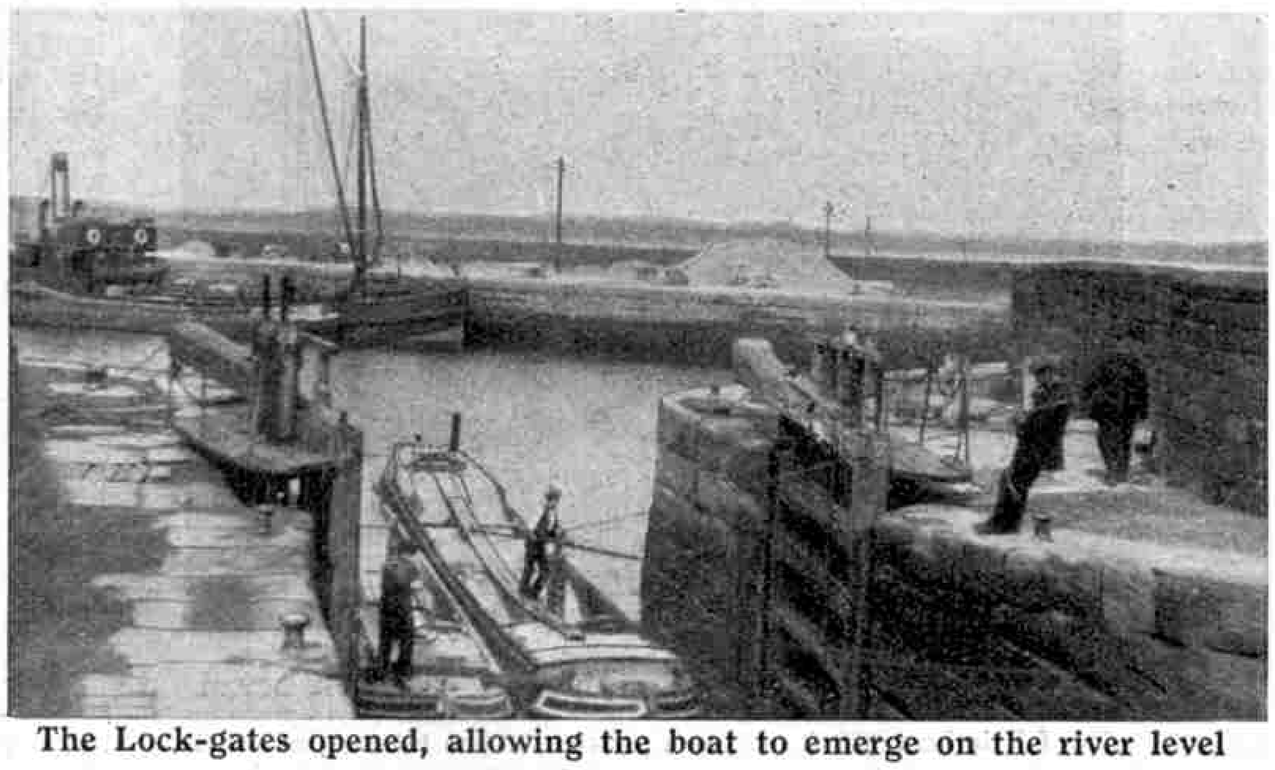
The immediate success of the Duke of Bridgewater's canal caused a revival of the Staffordshire canal project, and the salt and the earthenware manufacturers entered into co-operation with the principal landowners to push the scheme forward.

The Grand Trunk Canal

Brindley's plan for a canal was not adopted until after great controversy, however, for rival schemes were put forward. Among Brindley's chief supporters were the Duke of Bridgewater, Earl Gower, and Josiah Wedgwood, the famous maker of pottery, to whom we have already referred. A long Parliamentary struggle followed, but ultimately Brindley's plan was selected as being the best, and an Act authorising the construction of the canal was passed.

The Grand Trunk Canal, as Brindley named it, was the biggest undertaking of the kind yet attempted in England. Its length, including the junctions with the Birmingham Canal and the River Severn, was nearly 140 miles. Starting from the Duke of Bridgewater's canal at Preston-on-the-Hill, near Runcorn, it passed through the salt-manufacturing districts of Cheshire to the summit at Harecastle. From there it descended into the valley of the Trent, passed through the Potteries, and finally established communication with the Trent and the Severn.

Following his usual practice, Brindley concentrated all his locks on the summit at Harecastle. The rise of the canal from the level of the Mersey to Harecastle was 395 ft., and the fall from there to the Trent at Wilden nearly 289 ft. Ultimately 35 locks were built on the northern side of Harecastle and 40 on the southern side.



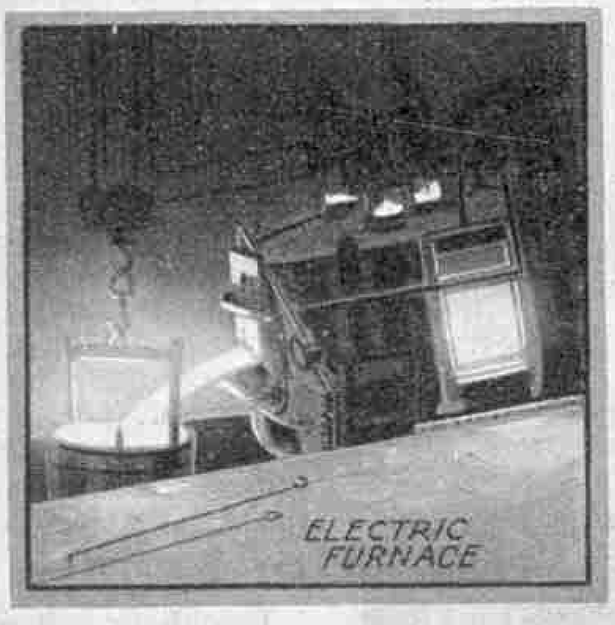
The Lock-gates opened, allowing the boat to emerge on the river level

A Great Tunnel Achievement

The most serious engineering difficulties of the canal were the five tunnels—Harecastle 2,880 yards in length; Hermitage 130 yards; Barnton 560 yards; Saltenford 350 yards, and Preston-on-the-Hill 1,241 yards.

The Harecastle tunnel involved the most difficult work in the whole undertaking, and it was confidently asserted by the defeated proprietors of the rival canals that its construction was impossible. Brindley, who did not admit the existence of the word "impossible," tackled the tunnel as soon as the Act was passed, and steady progress was made. At the same time work was carried on at other parts of the

(*Continued on page* 311)



Electricity

VIII. HYDRO-ELECTRIC POWER STATIONS

IN our issue last month we described the general features of an Electric Power Station in which the motive power used to drive the electric generators was steam, produced by the combustion of coal. Now we must see how the vast stores of energy in various parts of the world in the form of water power are utilised for the same purpose.

Lord Kelvin and the Niagara Falls

As soon as water power is mentioned one nearly always thinks of the gigantic falls at Niagara, where the total flow of water is about 270,000 cubic ft. per second. If the whole of this enormous power were utilised it would be sufficient to produce over seven-and-a-half million horse-power. Only 56,000 cubic feet of this vast flow is allowed to be used for power purposes, however, and of this Canada takes 36,000 cubic ft. and the United States 20,000. We therefore continue to be a long way from the time when the ideal of Lord Kelvin will be realised. "I look forward," said he, when at Niagara Falls, "to the time when the whole water from Lake Erie will find its way to the lower level of Lake Ontario through machinery, doing more good for the world than that great benefit that we possess in the contemplation of the splendid scene now presented by the waterfalls of Niagara."

Another famous electrician, Sir William Siemens, on visiting Niagara, had a similar vision. Although the mighty rush and roar of the waters filled him with awe, his keen brain instantly grasped the possibilities of the falls from a power-giving point of view, and he felt that the time must inevitably come when such a tremendous natural source of power could no longer be neglected.

Nature's Greatest Source of Power

Niagara has long been regarded as the world's greatest natural source of power, but it was not until 1842 that a practical scheme for utilising this power was put forward. In that year one Augustus Porter proposed the construction of a series of canals above the Falls. These were intended to lead the water down over large water-wheels, which were to drive machinery. After a good deal of negotiation a canal was constructed, 35 ft. in width, 8 ft. in depth and 4,400 ft. in length, and by 1885 some 10,000 h.p. was utilised.

In the following year a charter was obtained from the New York Legislature permitting sufficient water to be taken from the upper river to develop 200,000 h.p., and later the Canadian Government granted a concession allowing water for 250,000 h.p. to be drawn from the Canadian side of the falls. These concessions were obtained by a company now known as the Niagara Falls Power Company. Since then the Ontario Power Company and other great companies have established themselves at Niagara, and to-day about three-quarters of a million horse-power is drawn from the Falls.

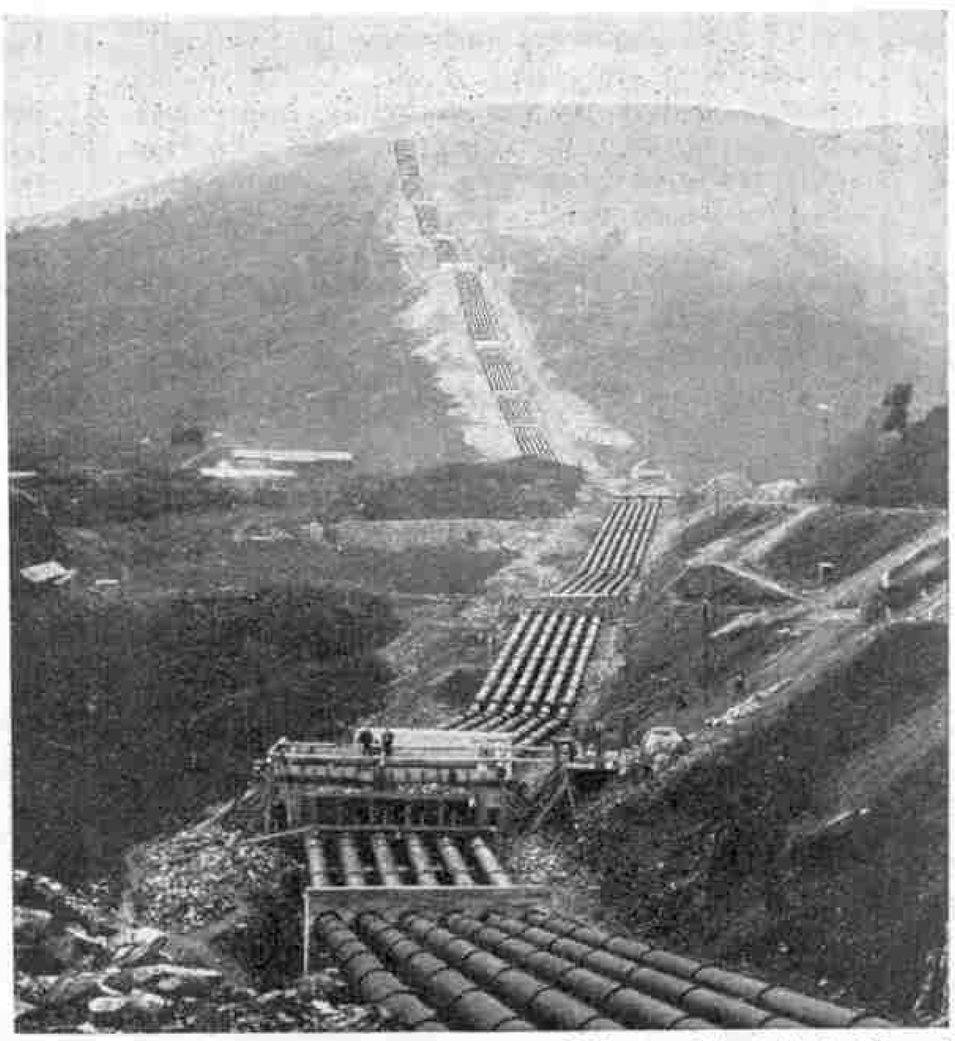


Photo courtesy [*Messrs. Glenfield & Kennedy*

The enormous and lengthy pipe-lines at Loch Leven

The fall is here 950 ft., giving a pressure, at the turbines, of 400 lb. per square inch

How the Water is Harnessed

To describe the plant of the various power companies would take up a great deal of space and would become monotonous, and therefore we will be content to give an outline of the plant of the Niagara Falls Power Company. Leading from the river about a mile above the Falls is the power canal, on each side of which are situated the company's power-houses. The difference of level between the upper river and the rapids below the falls is 200 ft. Beneath each power-house are several deep wells called "penstocks," which draw water from the canal and allow it to fall 180 ft. on to huge water turbines. After exerting its mighty power in passing through the turbines the water flows away along a tunnel, which empties itself below the Falls. This tunnel is about 7,000 ft. in length, and its construction occupied 1,000 men continuously for over three years, during which time 300,000 tons of rock were removed and 160,000 bricks were used to form the lining. The swiftly-turning turbines drive long vertical shafts, which in turn drive the moving parts of the electric generators at the surface of the ground. These generators are huge alternating current dynamos, in which the armature is fixed and the field magnets revolve outside it. The field-rings are mounted on the top ends of the shafts, the total weight of the two being about 35 tons. Shafts and rings revolve at the rate of 250 revolutions per minute.

Transmission of Power

Part of the enormous power generated at Niagara is used in the great industrial enterprises situated in the immediate vicinity of the Falls. The remainder is transmitted a great distance, the current being "stepped-up" to obtain economy in transmission, in the manner described in the article on Power Stations in last month's "*M.M.*" Raised to a pressure of 60,000 volts the current is transmitted to cities as far distant as 160 miles, while at a voltage almost twice as great electrical energy is supplied to areas within a radius of 250 miles. By means of yet higher pressures, say 220,000

volts, power from Niagara could be made to light the streets of New York.

Further schemes of development at Niagara are under consideration, among them being a proposal to dam the river about five miles above the Falls, thereby making available an estimated addition of 2,000,000 h.p. This increase of power would, it is calculated, provide half the electric power needed by the whole State of New York.

Modern Water Turbines

We have already mentioned the great water turbines used in the power plant at Niagara. These turbines are the successors of the old-fashioned water-wheels, but their efficiency is considerably greater. They may be divided into two main classes, (a) pressure or reaction turbines and (b) impulse turbines.

In the reaction turbine the water enters the wheel through fixed guide passages. These passages are so curved as to give the water a certain velocity in the direction of motion of the wheel. Entering the wheel of the turbine, the water flows along past curved vanes to which it imparts its energy and finally it passes out in such a direction that it has no further momentum in the direction of the wheel's motion.

In the impulse turbine the water is brought along a pipe-line under pressure and forms a jet moving at a very high velocity. This jet is directed on to a "runner" carrying some kind of buckets. Our illustration shows the runner of a 15,000 h.p. impulse turbine, which consists of a cast steel disc carrying 24 buckets. The complete runner weighs over 10 tons and each bucket weighs 375 lbs. The buckets, which are highly polished in order to reduce losses through friction, are attached to the disc by means of a specially-designed fastening. This fastening has to withstand two powerful and totally different forces—the continuous centrifugal force of the buckets themselves, and the impulse of a 30-ton jet of water occurring 300 times every minute.

Turbines of one or other of these types are used in all hydro-electric power plants, the choice of the particular type being decided by the height of the fall and other local circumstances.

Biggest Dam in the World

So much has been written about the production of electric power at Niagara that there is a danger of our overlooking the importance of other developments in the United States, many of which are on a vast scale. A particularly interesting project is that at Muscle Shoals in the State of Alabama. Muscle Shoals is a shallow stretch of the Tennessee River in which, in a distance of 37 miles, the river has a fall of 130 ft., making possible the development of a million horse-power.

When America came into the Great War it was realised that immediate steps would have to be taken to supply an enormously-increased quantity of explosives. Surveys of Muscle Shoals had previously been made, and the Government at once granted funds for the building of a great dam across the Tennessee River and the construction of hydro-electric plant on a gigantic scale. A dam was necessary on account of the shallowness and the small fall of the river, and also because the amount of water in the river varies very greatly in different seasons of the year. Consequently the huge Wilson Dam was commenced. This dam was not finished when the war came to an end, and its progress was temporarily checked, but its completion in the near future is assured and it will then be the largest dam in the world. A mile in length and 137 ft. in height, it will contain a million cubic feet of concrete—sufficient to make a path 18 inches wide and 1½ inches thick round the whole earth! The dam will have a power capacity of 600,000 h.p., and in addition to this its construction will have the effect of making the river navigable for almost its whole length.

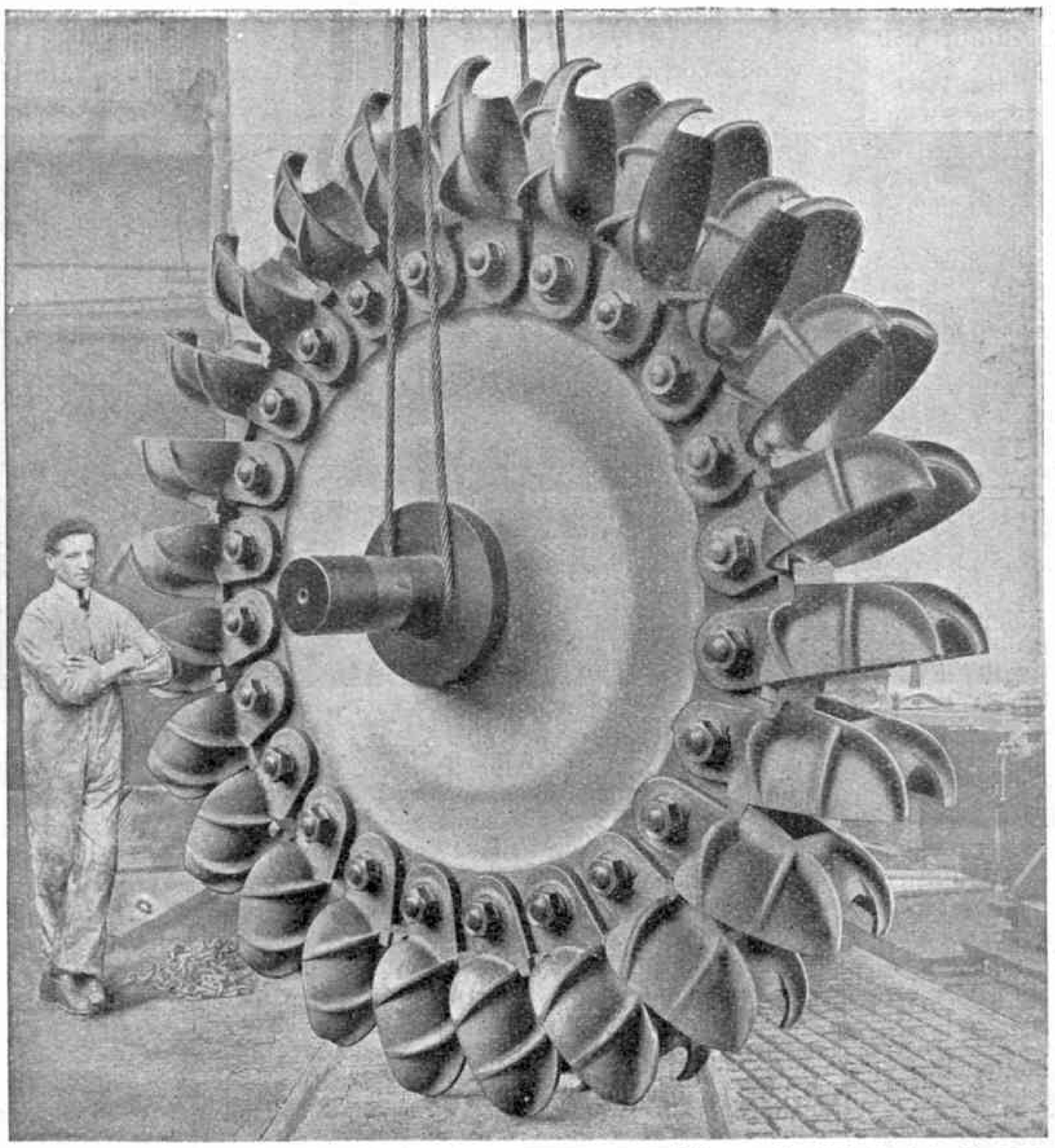


Photo courtesy [*Messrs. English Electric Co. Ltd.*

A Runner, with single-bolt Bucket attachment

Huge Scheme in California

Another colossal American hydro-electric project is that in the San Joaquin Valley in California. When the contemplated works here are completed, which probably will be in about 10 years' time, it is estimated that over 1,400,000 h.p. of electrical energy will be available, equal to the electrical requirements of more than 5,000,000 people. The scheme comprises reservoirs, tunnels and power stations located so as to impound and utilise the water of the San Joaquin and its tributaries. The idea originated as far back as 1883, but serious development was not begun until 1911, when it was realised that something must be done to meet the growing demand for electrical power in Los Angeles.

Highest Voltage yet Used

The construction of dams was commenced in 1912 and the first power-house was erected in the same year. To-day there are four power-houses in operation and development is still proceeding. Other dams are planned, and in a few years there will be a chain of great power-houses unequalled anywhere else in the world. Current is transmitted from this centre to the suburbs of Los Angeles, a distance of 270 miles, at the enormous pressure of 220,000 volts, which is the highest voltage yet used for commercial purposes.

At Great Falls on the Missouri River in Montana another vast hydro-electric plant is in operation. The river drops 400 ft. in a distance of about eight miles, and the energy thus developed is transformed into electric current, which —transmitted at a pressure of 100,000 volts—is used to drive the giant locomotives operating on the 440-mile section of the electrified track on the Chicago, Milwaukee and St. Paul Railroad.

There are many great hydro-electric plants at work in various other parts of the United States, in Canada and in South America, and Australia, New Zealand and Africa are rapidly developing their water resources. Another of the great hydro-electric schemes of the future will undoubtedly come into being in Rhodesia, where the Zambesi River has a potential capacity of 435,000 h.p. !

Development in India

An interesting development is in progress in India in an area lying some 40 or 50 miles south-east of Bombay. This area embraces the Western Ghats mountains and a number of lakes situated in the upper valleys of the range. Here the Tata Hydro-Electric Supply Company already have in operation one large power station, which is being extended to a capacity of 90,000 h.p. Another power station, having a planned capacity of 60,000 h.p., is practically completed.

The latest and largest scheme will provide for the supply from a third power station of some 100,000 h.p. for industrial, tramway, and railway purposes in Bombay. For this undertaking a masonry dam 150 ft. high and 4,000 ft. long is under construction, which will result in the formation of a lake 16 square miles in area. To convey the water through the mountains a tunnel 14,300 ft. long and 120 square ft. in section is being constructed and this will deliver the water to

(*Continued on page* 294)

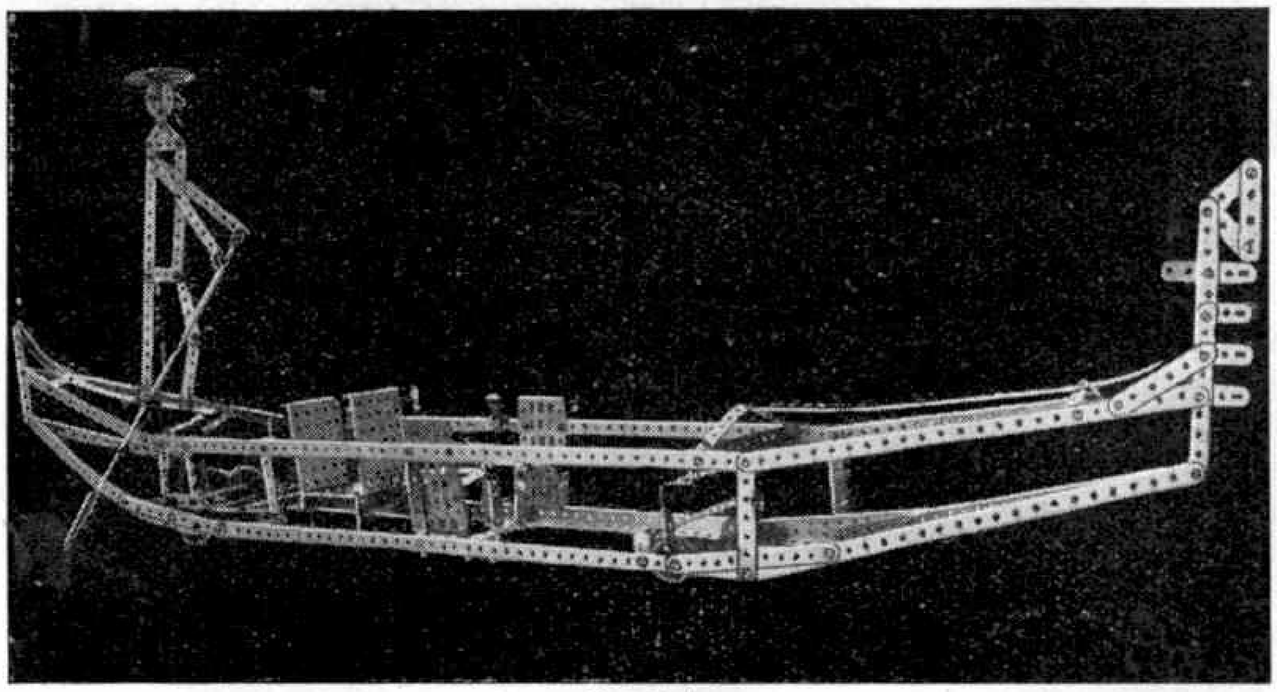
Further Adventures in Meccanoland

II. BRAINS AND INGENUITY IN THE CHAMPIONSHIP CONTEST

by "Spanner"

BEFORE passing on to other types of models submitted by competitors I want to illustrate two further humorous examples of a type of model that most of my readers no doubt will find interesting.

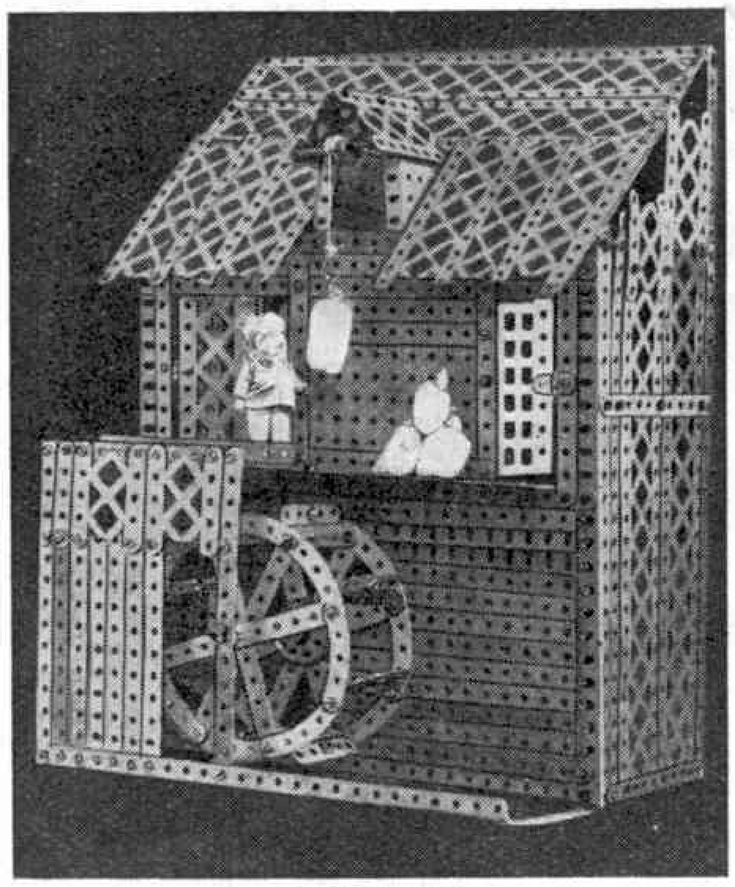
The first is a Gondola, entered by G. W. Healy, of London. This model is quite nicely proportioned, and Master Healy tells us that the gondolier actually rows when the gondola is pushed along the floor. This is very interesting and ingenious, of course, but at the same time I do not think that this competitor has made quite the most of his model. For one thing its general appearance gives the impression of flimsiness, and further, the designer has omitted the cabin in the centre of the boat, which is a characteristic feature of all gondolas intended to carry passengers. I feel sure that some of my readers could improve on this model and, no doubt, Master Healy himself could carry his own design a little further.



Gondola

(Entered by G. W. Healy, London)

While looking at this model I recalled the recent statement made in a number of newspapers that the rowing gondola on the canals of Venice is doomed, and that within the next eighteen months every gondola must be fitted with an

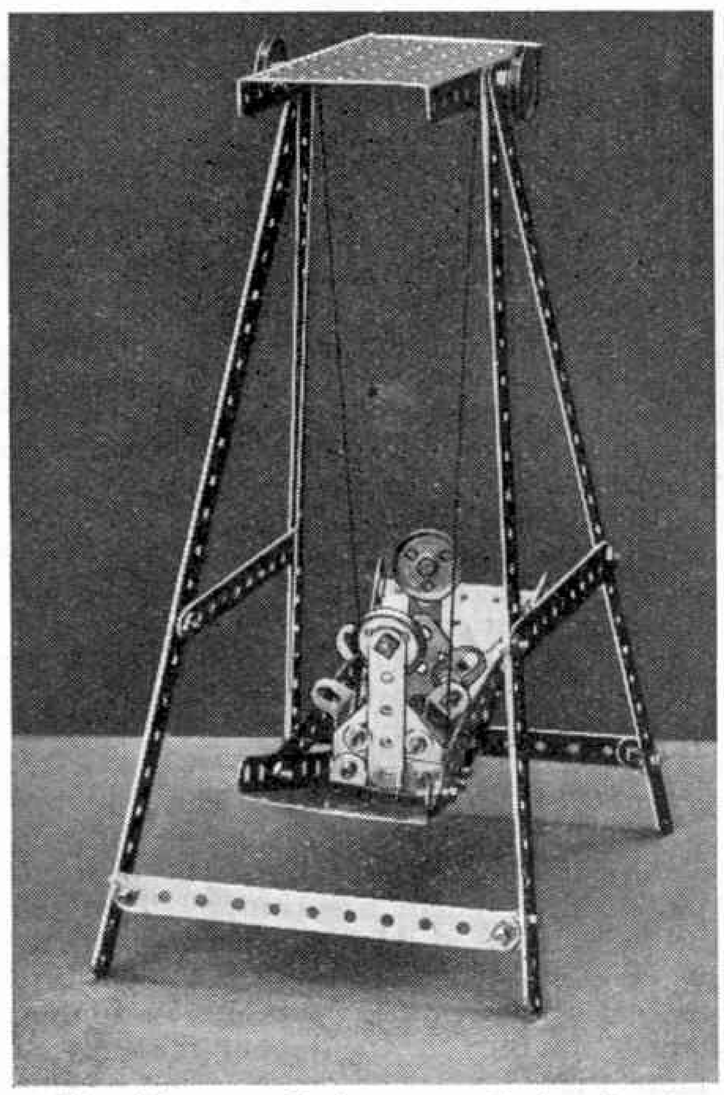


Water-Mill

(Entered by M. Michel, of Havre)

electric motor. It is difficult to believe that this is really the decision of the Venetian authorities, and I should have thought that they would be much more likely to prohibit motor gondolas altogether. Motor boats moving swiftly along narrow canals inevitably raise a considerable amount of wash, and I believe that there have already been complaints that the wash from the comparatively small number of motor boats at present running is damaging the water-fronts of some of the ancient Venetian buildings. The general introduction of motor power would certainly speed up traffic in Venice, but all those who have visited this wonderful city will feel regret at the thought of the disappearance of the picturesque gondolier.

Another model on humorous lines is "The Twins on a Swinging Boat," submitted by M. Manning, of Bristol. I have already given one example of the work of this competitor, who appears to have a strong leaning towards models of this kind, and certainly he possesses considerable skill in designing them. He even goes as far as to suggest that Meccano Ltd. should feature humorous models a little more strongly, on the ground that such models would appeal to the younger Meccano boys. I think it is quite probable that Master Manning is not very far wrong in this idea.

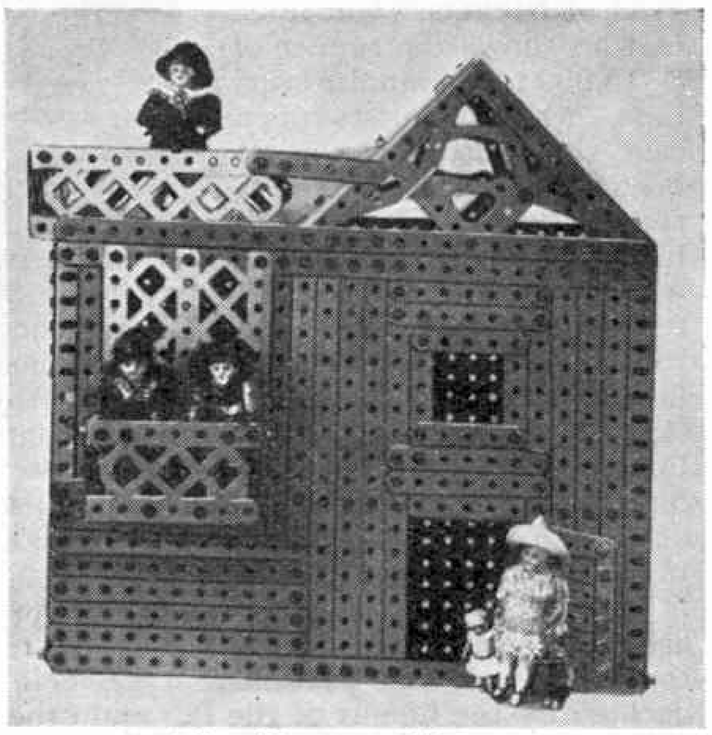


The Meccano Twins on a Swing Boat

(Entered by M. Manning, Bristol)

I was rather surprised to find that such a large number of competitors had tried their hands at designing sailing ships and steamers, and I was struck by the pleasing results obtained. I have only space to illustrate one example of this type—an interesting model of a steamer sent in by J. Ruwet, of Liege. The designing and building of this model must have called for a great deal of thought and ingenuity, and the result is certainly quite successful. The model evidently follows the lines of Continental-built steamers, and I have no doubt that many of my readers could design a vessel that would resemble more closely the production of our own shipyards.

With reference to marine designs I may mention in passing that there appears to be a great deal of scope in models of various types of Dredgers, Fire-Boats and such like vessels, in addition to Repair Ships carrying cranes and similar appliances.



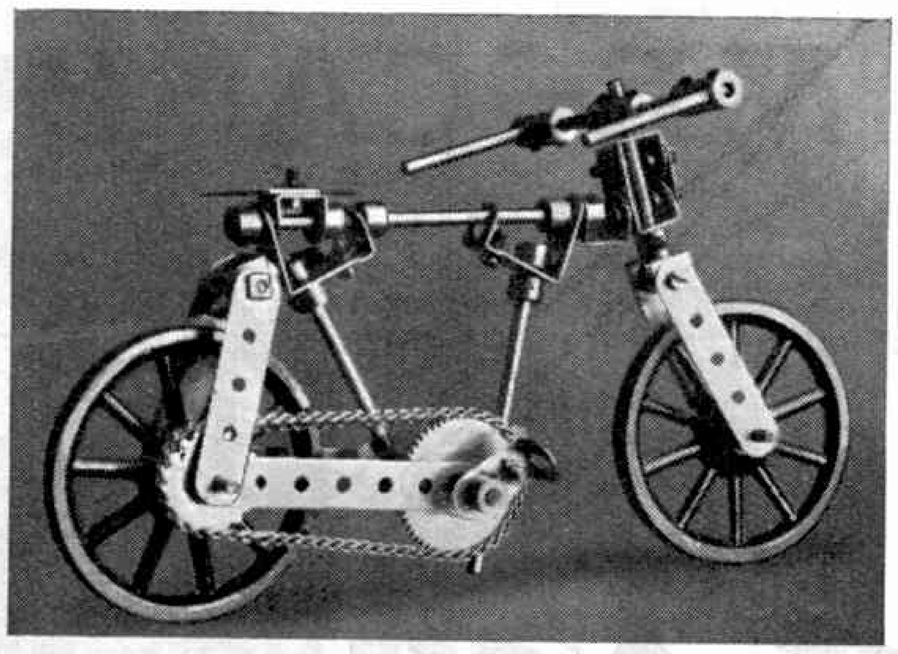
The Meccano House

(Entered by J. R. P. Yraolo, of Buenos Aires)

While I was enjoying myself among the humorous entries I came across two or three models that struck a really tragic note. One of these was a model of an old-time gibbet on which our forefathers used to hang malefactors for even such small offences as stealing a sheep! One or two Meccano boys in France sent in models of a guillotine which, as we all know, is the apparatus used for cutting off the heads of criminals who are sentenced to death in that country, our method of

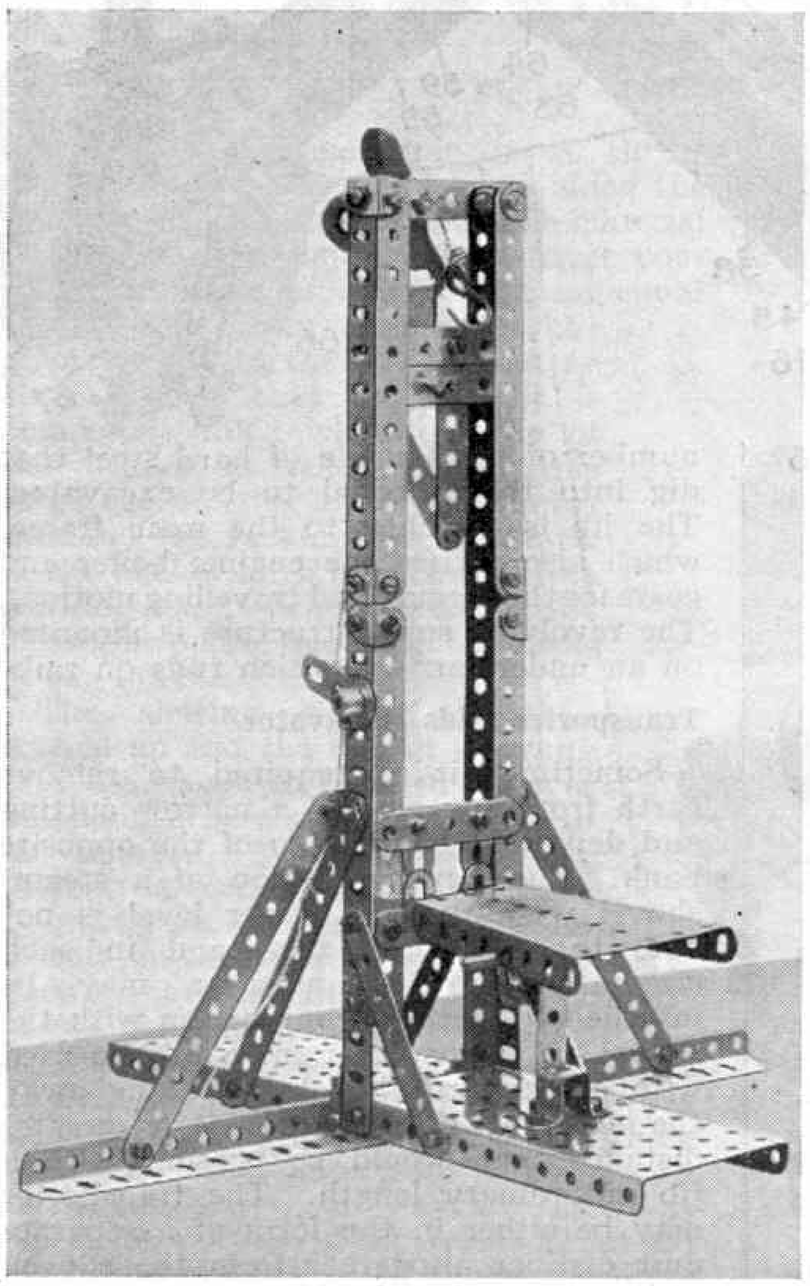
hanging apparently not being considered good enough!

Mention of the name "guillotine" brings up memories of the tragic times of the French Revolution, when the French Communists sent so many of their fellow-countrymen to death. This unpleasant instrument was officially introduced into France in 1792 as the means of inflicting capital punishment. It was named after the man who was believed to be its inventor, Dr. Joseph Guillotin. I am able to illustrate one of these models submitted by Rene Lafette, of Belfort, who states that, both in shape and in method of operation, it closely resembles a real guillotine. It certainly is a sinister-looking object, and its effectiveness might be further added to by using a safety-razor blade as the knife, in which case perhaps somebody's dolls would make good subjects (or objects) for decapitation! As far as I am concerned I should always handle the model with the greatest care for fear of getting my finger in the wrong place!



A Meccano Bicycle

(Entered by F. E. Salom, of Barcelona)



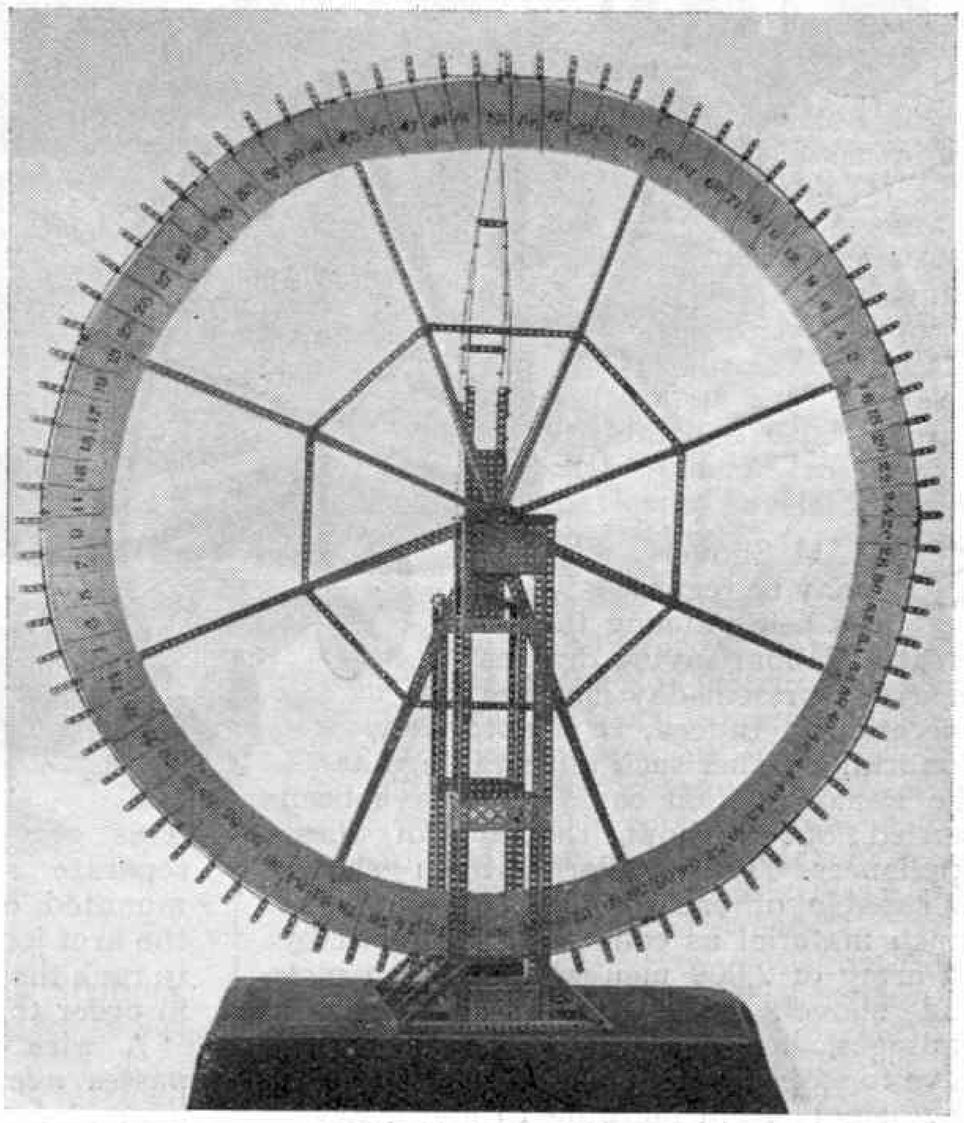
Guillotine

(Entered by Rene Lafette, of Belfort)

It is rather interesting to remember that there is another form of guillotine that is employed for much more pleasant purposes. This is the machine used by printers and bookbinders for cutting paper and trimming the edges of books after the sheets have been sewn together. This machine is similar in general construction to its gruesome big brother.

Another model from France is one sent in by Pierre Boudier, of Rouen, which is named a "Persian Roulette." You know, of course, that roulette is a gambling game, and apparently the big wheel with the numbers on it is spun round rapidly and the person whose number stops at the vertical pointer is the winner. Along with his entry the inventor enclosed a cutting from a Rouen newspaper, containing an account of a juvenile ball that was held recently at the Hotel de France, Rouen, where his model was used for distributing prizes. For the benefit of my readers, most of whom undoubtedly study French at school, I give the following extract from the newspaper:—"*Une Loterie fit des heureux; les lots étaient de qualité; ils avaient été offerts par les commercants rouennais. Et le jeu de la roulette persane, édifié grâce a l'ingeniosité etonnante de M. Pierre Boudier, seulement âgé de* 14 *ans, fonctionna à merveille.*"

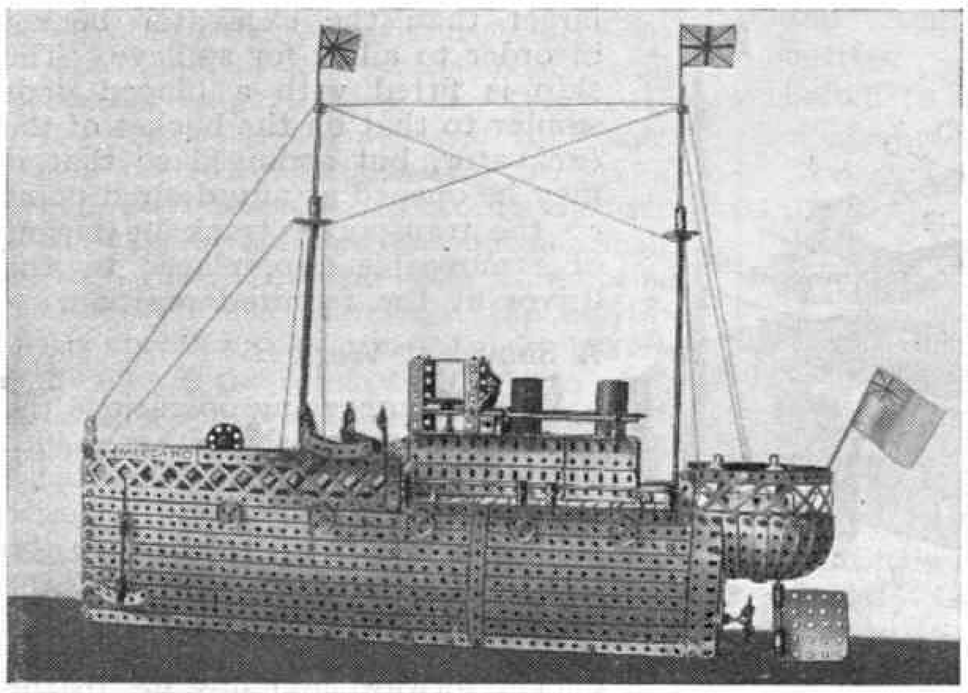
I noticed that many of the entrants in this competition had utilised Meccano parts for constructional purposes, and in the majority of cases had met with considerable success. Take, for instance, the "Meccano House" designed by J. R. Pereyra Yraolo, of Buenos Aires. Here we see young ladies looking out on the balcony while "mother," a matron of quite remarkable dignity, enjoys the sun on the roof garden. I am inclined to think that the designer of this model had some help from a sister, and I can imagine the fun that the building, decorating, and photographing of this model created in the family circle. Another model on very similar lines is the "Water-Mill" entered by Maurice Michel, of Havre, France. Master Michel, in describing his model, states that it is operated by a Meccano electric motor and that with each turn of the wheel the sack of flour is raised or lowered. There is quite a lot of fun to be had from models of this kind, and I should very much like to see the idea further developed.



Persian Roulette

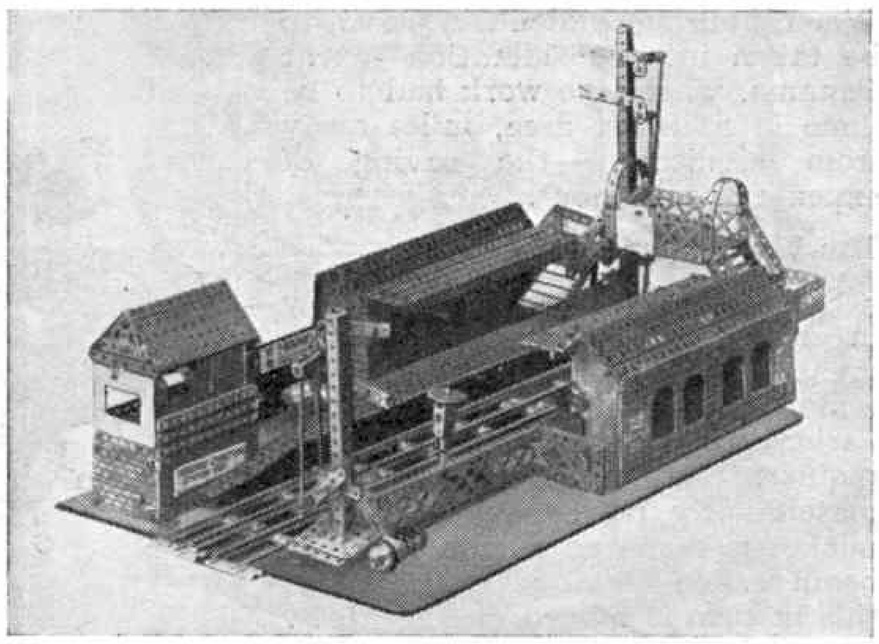
(Entered by Pierre Boudier, of Rouen)

(*Continued on page* 294)



Meccano Steamer

(Entered by J. Ruwet, of Liege)

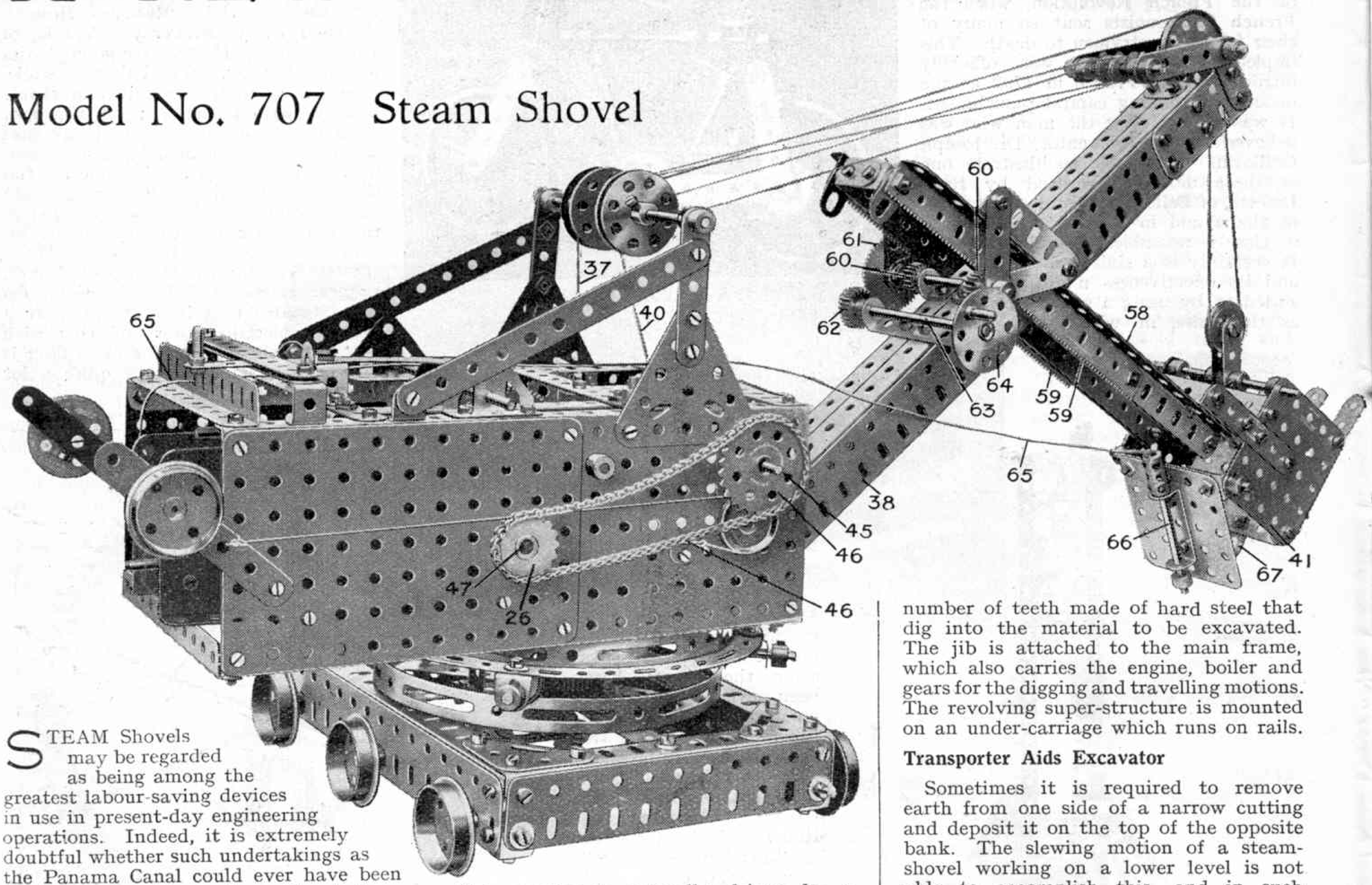


Railway Station

(Entered by D. Crankshaw, of Nelson)

A NEW MECCANO MODEL

Model No. 707 Steam Shovel



STEAM Shovels may be regarded as being among the greatest labour-saving devices in use in present-day engineering operations. Indeed, it is extremely doubtful whether such undertakings as the Panama Canal could ever have been carried out without the aid of these appliances. The modern steam shovel is capable of excavating in one day as much material as could be dealt with by an army of 2,000 men working with pick and shovel. One of its greatest advantages, however, is that it does not have to stop for meals or to rest. It works unceasingly from morning to night, never relaxing its output, and during this time requires only about three men to attend to it. Some idea of the vast amount of work that these machines can get through may be gained by considering the fact that the eighty steam shovels employed in the construction of the Panama Canal were the equivalent of 160,000 men! When housing difficulties have to be taken into consideration—as at Panama, where the work had to be done in a desert area, miles away from civilisation—the saving of expense is enormous.

The Mechanism

Steam shovels are used chiefly in engineering operations in which great quantities of earth have to be removed. They are constructed in various sizes, according to the output required and the nature of the material to be excavated. The bucket is mounted at the end of a beam called the bucket arm, and this in turn is moved on the jib by long racks meshing with gear wheels. This gearing is generally driven by a separate set of self-contained engines, mounted on the jib at the point where the arm joins it, and this makes it possible to rack the bucket arm in or out as desired, in order to vary the working radius.

A wire rope attached to the bucket passes over a pulley at the top of the jib and from there to the winding drum, the arrangement being similar to that in a crane. When the gear is thrown in, the drum winds and the bucket is drawn upward, pivoting at the point at which the bucket arm is fixed to the jib. One edge of the bucket is fitted with a cutting edge known as the "lip," and this has a number of teeth made of hard steel that dig into the material to be excavated. The jib is attached to the main frame, which also carries the engine, boiler and gears for the digging and travelling motions. The revolving super-structure is mounted on an under-carriage which runs on rails.

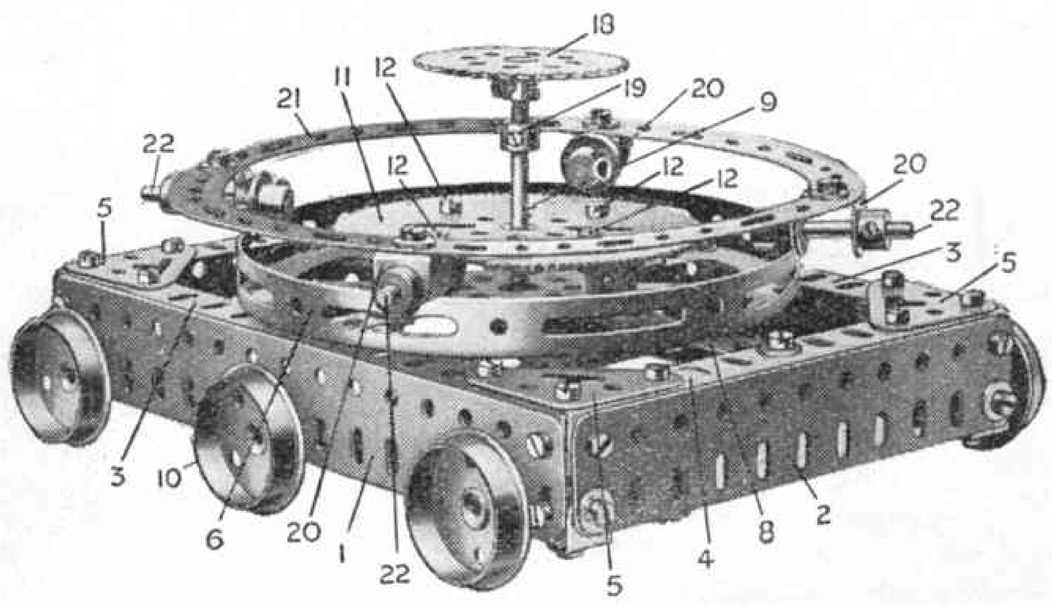


Fig. A

Transporter Aids Excavator

Sometimes it is required to remove earth from one side of a narrow cutting and deposit it on the top of the opposite bank. The slewing motion of a steam-shovel working on a lower level is not able to accomplish this, and in such circumstances a transporter may be installed to work in conjunction with the shovel. A transporter may also be used with a standard shovel for taking away the excavated material to a greater distance than would be possible with a jib of ordinary length. The transporter may be either in the form of a separate unit distinct altogether from the shovel, or it may consist of a framework attached to the shovel and worked by the main engines.

In both types the earth to be dumped is run up the inclined track of the transporter in a skip, which is made slightly larger than the excavator bucket in order to allow for spillage. The skip is fitted with a hinged door similar to that on the bucket of the excavator, but arranged so that it may be opened at any desired point on the transporter track by means of a moveable trip, placed by the driver at the required position.

A Shovel at Work

When commencing operations the bucket of a steam shovel hangs in a vertical position with the teeth resting on the ground opposite the face of the material to be removed. The driver starts up the engines and throws in the hoisting clutch, and this action drags the bucket forward and upward to the

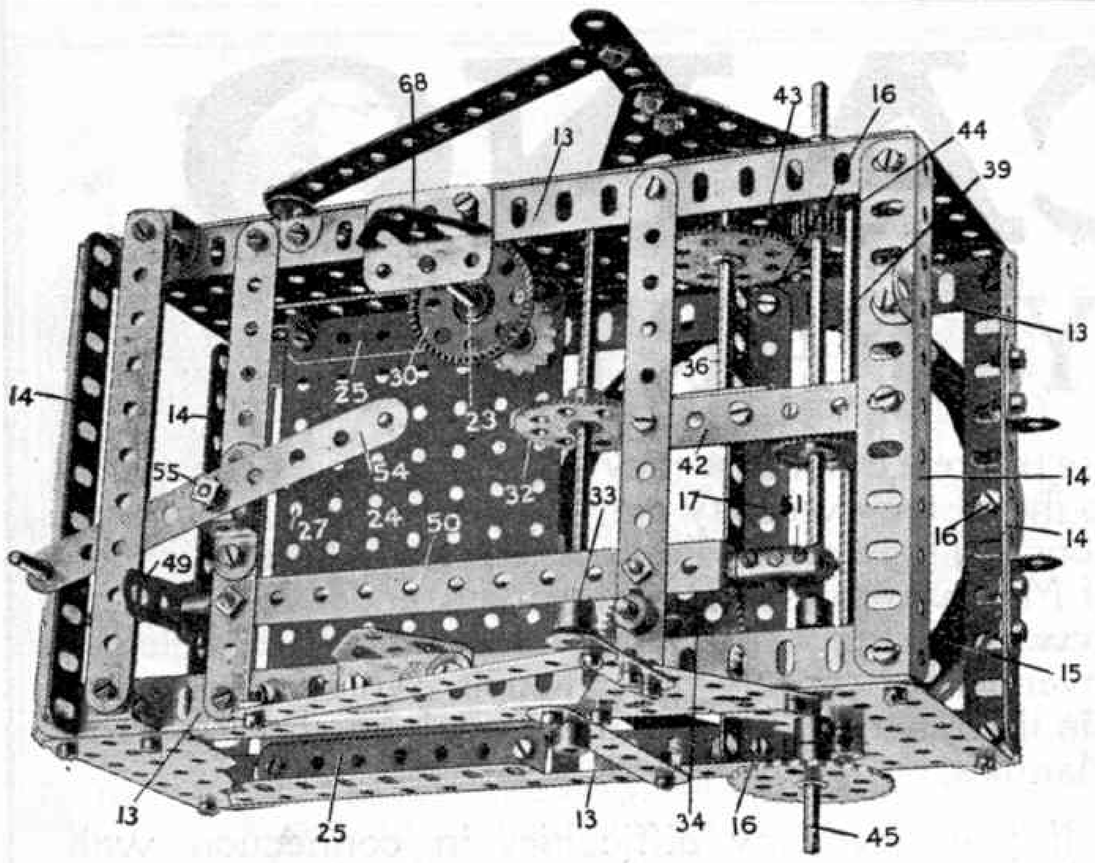


Fig. B

face. At the same time it is thrust outward by means of the racks along the bucket arm until it cuts away the material to the required depth. The driver controls the depth of cut so that an equal thickness is taken throughout the whole length of the stroke, and he thus ensures that the bucket is completely filled when the top of the stroke is reached. At this stage the hoisting clutch is thrown out and the racking motion draws in the bucket until it is clear of the working face, being held in the meantime on the free drum by means of the brake.

The slewing motion is then started up and the bucket is swung over the wagon to be filled, or over the point where the material is to be dumped. When the correct position is reached the driver pulls a cord by his side and so withdraws a catch on the bucket door, thereby allowing the contents of the bucket to be discharged. The slewing motion is then reversed and the bucket is swung back into position to take the next cut from the working face. These operations take place very quickly, and the whole series, or "cycle" as it is called, is performed in from 20 to 60 seconds, the actual time depending upon the size of the machine and the length of the jib.

From Bucket to Tipping Point

When a separate transporter is employed the shovel takes a cut and discharges the material into the skip which stands ready at the foot of the transporter track. When the skip is filled, the transporter driver starts his engines and the loaded skip is hauled up its track to the tipping point. Here the catch holding the door of the skip is knocked out automatically by trip gear, and the skip is emptied. The driver then throws out the hoisting clutch and the skip is lowered by gravity to the foot of the track, the drum to which its hauling rope is attached being allowed to run free, but controlled by the driver with a brake.

An excavator working with a separate transporter is capable of a larger output than a long-jib shovel of equal bucket capacity, largely because the machine has a shorter jib and therefore is able to slew round more quickly. Also it is found that the coal consumption of the two separate machines is slightly less than that of a single long-jib machine, because the latter is very much heavier and requires more power to work it. The only disadvantages of any importance are that an extra man is required to work the transporter and that tracks must be laid for two machines instead of one.

The Meccano Model

This new Meccano model of a Steam Shovel is an excellent representation of a typical machine. The bucket is fitted with a collapsible bottom and the bucket arm is mounted separately on the jib, its position thereon being controlled by rack and pinion, actuated by hand-wheel. The model includes several interesting features, including a roller-race, in which the circular strip (a new part, No. 145) is used.

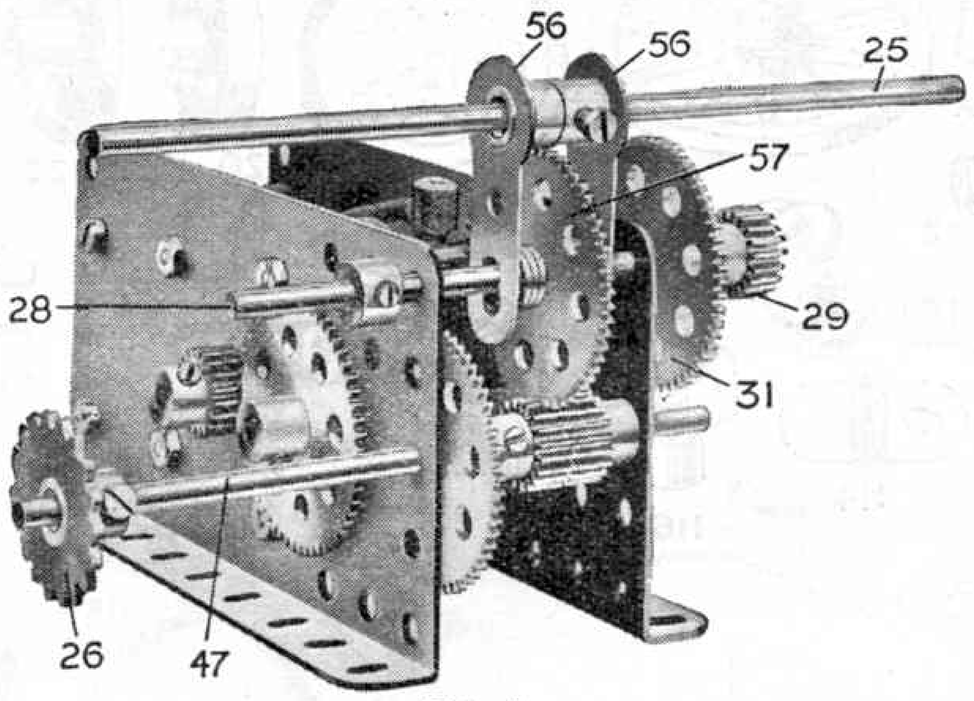


Fig. C

Constructing the Model

Begin by building up the base frame (Fig. A) from $7\frac{1}{2}''$ Flat Girders (1) at the sides, and $5\frac{1}{2}''$ Flat Girders (2) at the front. These are joined to $7\frac{1}{2}''$ and $5\frac{1}{2}''$ Angle Girders (3 and 4 respectively) braced with Corner Brackets (5) at the top, and Angle Brackets at the bottom. A Hub Disc (6) is bolted to a $7\frac{1}{2}''$ Strip (8), which is secured across the Angle Girders and also bolted to two side Angle Girders (3). The vertical $4\frac{1}{2}''$ Rod (9) is then passed through the centre hole of the Strip (8), and beneath is secured a Bevel Wheel. This engages another Bevel Wheel on the axle, which carries the central travelling wheels (10) and is connected by Sprocket Wheels and Chain to the rear axle. The large $3\frac{1}{2}''$ Gear Wheel (11) is then secured to the Hub Disc by four $\frac{1}{2}''$ Reversed Angle Brackets by Bolts (12).

Building the Body

The body (Fig. B) consists of two $5\frac{1}{2}'' \times 3\frac{1}{2}''$ Flat Plates, overlapped three holes to form each side. These are secured to $9\frac{1}{2}''$ Angle Girders (13) along the upper and lower edges, and these are connected across by $5\frac{1}{2}''$ Angle Girders (14). Beneath the body is bolted a Circular Girder (15) by bolts (16) across which, held by the same Bolts, is a $5\frac{1}{2}''$ Angle Girder (17). Through this Angle Girder passes the Rod (9) carrying a 2" Sprocket Wheel (18). A Collar (19) engages above the Angle Girder Circular Strip* (17).

The Roller Race

Next build up the roller race (Fig. A) formed of four Double Brackets (20), bolted to a Circular Strip* (21). $\frac{1}{2}''$ Fast Pulleys are secured on $1\frac{1}{2}''$ Rods (22), which are also secured with Collars on the outside. The whole is then placed on the top edge of the Hub Disc and the body is threaded on to the Rod (9) in the centre hole of the Angle Girder (17). After the Collar (19) is secured in position, the Sprocket Wheel (18) is bolted to the Rod (9).

The top bearing for the $3\frac{1}{2}''$ Rod (23) is formed by a $1\frac{1}{2}''$ Flat Girder, over which is secured a Trunnion. A $3\frac{1}{2}'' \times 5\frac{1}{2}''$ Flat Plate (24) is secured to each side of the body by $3\frac{1}{2}''$ Angle Girders (25) in the second hole up. This provides a bed to which the electric motor is secured. On the lower part of the Rod (23) is secured a $\frac{3}{4}''$ Sprocket Wheel from which a Chain drives the Sprocket Wheel (18) which operates the lower bevels to drive the travelling wheels.

The Power Unit

Now build up the motor unit, leaving off the Rod (25) and Sprocket (26). (The Gear Wheels and Rods are clearly seen in Fig. C). The motor is then secured to the plate (24), the correct position being found when the fourth hole from the back of the motor registers with hole (27) in the plate.

When the motor is in position, owing to the Rod (28) being slideable the Pinion (29) may be engaged with the Contrate Wheel (30) or the Gear Wheel (31) with the Gear Wheel (32). The spindle of the other Gear Wheel (32) carries

(*Continued on page* 309)

* This new Meccano part will be announced shortly

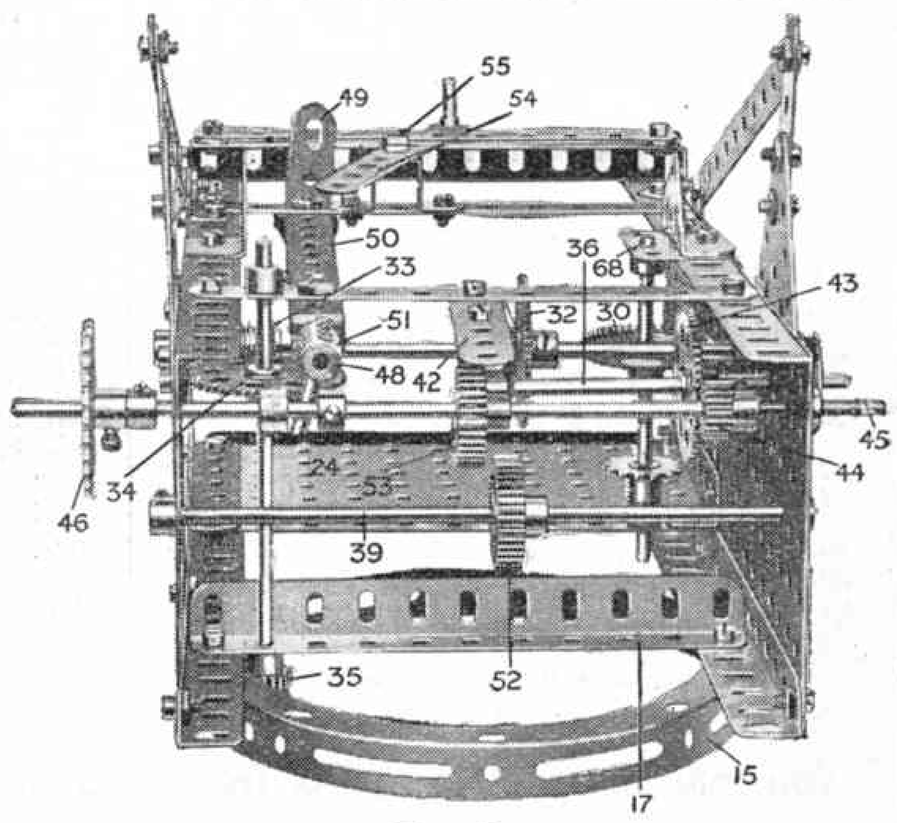


Fig. D

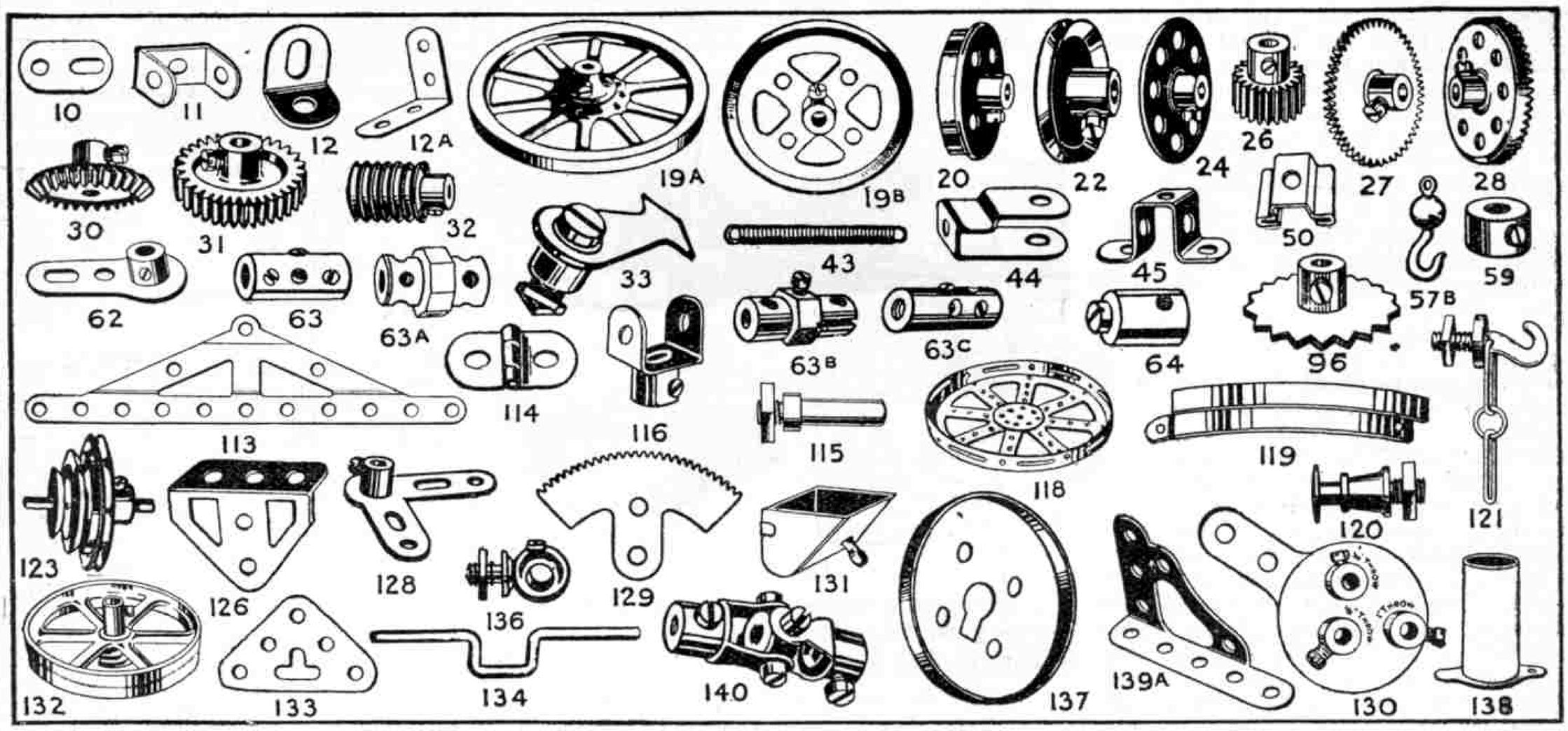
MECCANO
ACCESSORY PARTS

We illustrate below a selection of accessory parts that every Meccano boy will find useful for building the larger and more interesting models. Sometimes a model may be described in these pages that is beyond the capabilities of one of the smaller Outfits, but by purchasing a few extra parts, it becomes possible to build the model.

Then again, where it is not desired to purchase an Accessory Outfit in the first instance, an Outfit may be gradually converted into a higher Outfit by purchasing the necessary parts, from time to time.

Many of these parts have only recently been introduced, and although we know that they have a universal use (were it otherwise they would not have been added to the system) we may not yet know all their applications. There are endless possibilities in the application of Meccano parts, and brainy boys endeavour to find new applications for them, and they make possible the invention of entirely new models, which gives more fun than merely copying the models in the Meccano Manuals.

If you have any difficulties in connection with using these parts, or any suggestions for new parts not already in the system, write to Meccano Ltd., Binns Road, Liverpool, and mark your envelope "Bright Ideas."

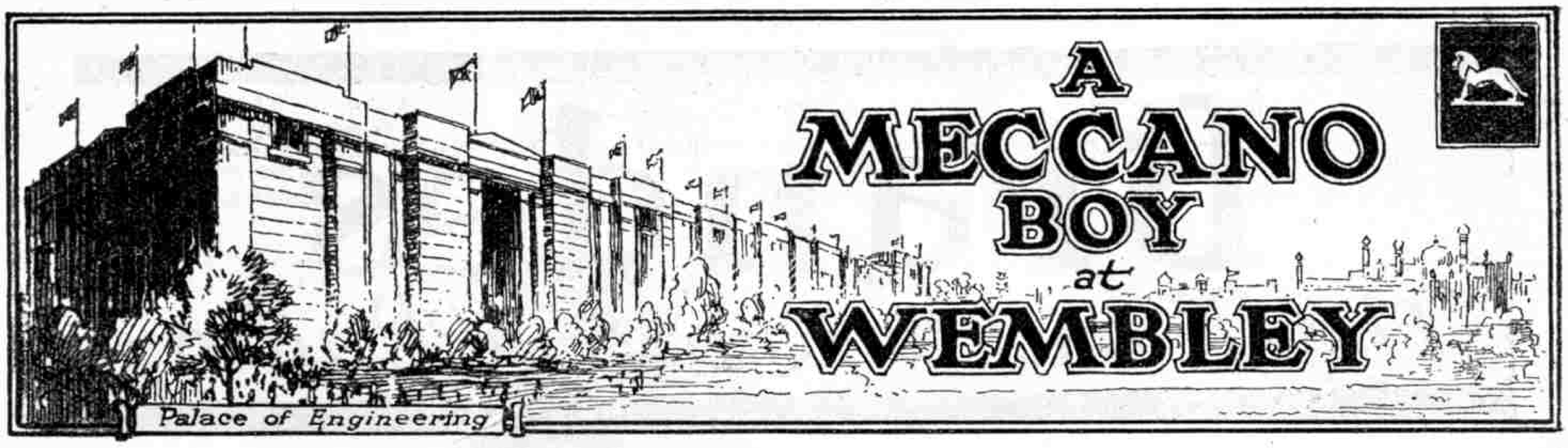


No.		s.	d.
10.	Flat Brackets ... ...½ doz.	0	2
11.	Double Brackets ... ... each	0	1
12.	Angle Brackets, ½"×½" ... ... doz.	0	6
12A.	" " 1"×1" ... ... each	0	1
12B.	" " 1"×½" ... ... "	0	1
19A.	Wheels, 3" diam. with set screws ... "	0	8
20.	Flanged Wheels ... ... "	0	6
	Pulley Wheels.		
19B.	3" dia. with centre boss and set screw each	0	8
19C.	6" " " " " " "	2	6
20A.	2" " " " " " "	0	6
21.	1½" " " " " " "	0	6
23A.	¾" " " " " " "	0	4
22A.	1" " without " " " "	0	2
23.	½" " " " " " "	0	2
24.	Bush Wheels ... ... "	0	6
25.	Pinion Wheels, ¾" diam. ... ... "	0	6
26.	" " ½" " ... ... "	0	4
27.	Gear Wheels, 50 teeth ... ... "	0	9
27A.	" " 57 " ... ... "	0	9
28.	Contrate Wheels, 1½" diam. ... ... "	0	9
29.	" " ¾" " ... ... "	0	6
30.	Bevel Gears ... ... "	0	10
31.	Gear Wheels, 1", 38 teeth ... ... "	1	0
32.	Worm Wheels ... ... "	0	6
33.	Pawls (complete) ... ... "	0	4
33A.	Pivot Bolts with Nuts ... ... "	0	2
43.	Springs ... ... "	0	2

No.		s.	d.
44.	Cranked Bent Strips ... ... each	0	1
45.	Double Bent Strips... ... ... "	0	1
50.	Eye Pieces ... ... "	0	2
57.	Hooks ... ... "	0	1
57A.	" (scientific) ... ... "	0	1
57B.	" (loaded)... ... ... "	0	5
58.	Spring Cord ... ...per length	0	9
59.	Collars with Set Screws ... ... each	0	2
62.	Cranks ... ... "	0	3
62A.	Threaded Cranks ... ... "	0	4
63.	Couplings ... ... "	0	6
63A.	Octagonal Couplings ... ... "	0	8
63B.	Strip Couplings ... ... "	0	8
63C.	Threaded Couplings ... ... "	0	6
64.	Threaded Bosses ... ... "	0	2
65.	Centre Forks ... ... "	0	2
94.	Sprocket Chain ... ...per length	0	6
95.	Sprocket Wheels, 2" diam. ... ... each	0	5
95A.	" " 1½" " ... ... "	0	4
95B.	" " 3" " ... ... "	0	6
96.	" " 1" " ... ... "	0	3
96A.	" " ¾" " ... ... "	0	3
109.	Face Plates, 2½" diam. ... ... "	0	4
113.	Girder Frames ... ... "	0	2
114.	Hinges ... ... per pair	0	4
115.	Threaded Pins ... ... each	0	2
116.	Fork Pieces ... ... "	0	3
117.	Steel Balls, ¼" diam. ... ... doz.	0	6

No.		s.	d.
118.	Hub Discs (5½" diam.) ... ... each	1	3
119.	Channel Segments (8 to circle, 11½" diam.) ... ... "	0	4
120.	Buffers ... ... "	0	2
120A.	Spring Buffers ... ... per pair	0	8
121.	Train Couplings ... ... each	0	4
122.	Miniature Loaded Sacks ... ... "	0	2
123.	Cone Pulleys ... ... "	1	3
126.	Trunnions ... ... "	0	3
126A.	Flat Trunnions ... ... "	0	2
127.	Simple Bell Cranks ... ... "	0	3
128.	Boss Bell Cranks ... ... "	0	4
129.	Rack Segments, 3" diam. ... ... "	0	6
130.	Triple Throw Eccentrics ... ... "	1	3
131.	Dredger Buckets ... ... "	0	2
132.	Flywheels, 2¾" diam. ... ... "	2	3
133.	Corner Brackets ... ... "	0	3
134.	Crank Shafts, 1" stroke ... ... "	0	3
136.	Handrail Supports ... ... "	0	3
137.	Wheel Flanges ... ... "	0	4
138.	Ship's Funnels ... ... "	0	4
139.	Flanged Brackets, right ... ... "	0	2
139A.	" " left ... ... "	0	2
140.	Universal Couplings ... ... "	0	9
141.	Wire Lines (for suspending clock weights) ... ... "	0	9
142.	Rubber Rings ... ... "	0	4
143.	Circular Girders, 5½" diam. ... ... "	1	0

You may obtain these parts from your dealer, or direct from MECCANO LTD., BINNS ROAD, LIVERPOOL.



(*Continued*)

ALTHOUGH I had been over two hours in the Palace of Industry, I did not feel a bit tired—that feeling didn't come over me until I got home (at well after midnight!). I suppose it was the excitement and wonder of it all that kept me "keyed-up." Continuing my tour of the chemical section I came to that part where they were making soap.

Now it is a common joke to suppose that we boys are not fond of soap, but I am sure every boy could not help but be interested in watching its manufacture on Messrs. Gibbs' stand. I was more particularly interested because I have often noticed Messrs. Gibbs' advertisement in the "*M.M.*"

"Bonzo" in a New Rôle

First the various ingredients are placed in a huge funnel attached to a contrivance that is something like a large sausage-making machine. Then a very pleasant perfume is poured in and the whole is thoroughly stirred by machinery until it becomes a creamy mixture. It is then passed through to another machine in which it is compressed, and produced in a rounded strip looking for all the world like tooth-paste coming from its tube. This strip is cut into small pieces, the corners are cut off by girls, and the pieces placed in a small iron die. A lever is raised and dropped and a perfectly-moulded tablet of Cold Cream Soap, stamped with the makers' name, is the result! Each tablet is examined to see that it is smooth and perfect, and it is then passed on to be wrapped and packed in a dainty box.

There was such a lovely scent near this stand that I thought there must be a flower-garden round the corner. I found it came from a perfume stall where the attendants were spraying various perfumes to demonstrate their fragrance. I noticed our old friend "Bonzo" sitting on top of an alabaster bowl, and was much amused to find that he was holding a cleverly-concealed scent spray!

Needle-making

As time was quickly passing I hurried through the china section, where beautiful bowls and vases were displayed, and the household section where dozens of labour-saving devices were exhibited, until I came to where Messrs. Abel Morrel & Co. were exhibiting a needle machine that was in use nearly fifty years ago and which Queen Victoria had admired at a previous Exhibition. The machine was still working, and as I watched the eye being put into each needle separately I thought what a slow process it was, making needles by the old method. Turning round I saw a very different process in the modern needle-making machine, from which the needles were sliding by the hundreds every minute. I did not know until then that needles are made in pairs, points outward, and the eyes punched in the middle of the bars, the needles afterwards being separated.

Stocking-Weaving—the Old Way and the New

There was the whirr and rattle of machinery coming from the next avenue,



By permission] [*Editor of "Mersey"*

Mr. Smith (watching the "Mammoth" Crane moving up the Mersey): "Look! Polly, at that ship taking that great Meccano Model to Wembley!"

so I wended my way to where a man was patiently weaving silk stockings on an old-type machine, consisting of a frame about 3 ft. in width. On this were strung strands of silk and the thread had to be started on its journey each time by hand before the shuttle took it across. The work is very trying for the eyes, especially as it is necessary to have a bright light near the work the whole time, and to ensure that the threads are run closely together. On this machine an expert weaver only makes one pair of stockings a day.

In contrast to this machine was a modern stocking loom, on which a dozen pairs of stockings are woven at once and attendants merely pass up and down to see that all is going well. It was wonderful to watch the numerous shuttles darting through, and then resting while a shuttle with another colour of silk took its turn. I watched while about an inch of colour was woven, then a series of small steel bars slid along about an inch on the machine and at once all the shuttles with another colour came into action. In a few moments a wonderful pattern of squares and diamonds was formed before my eyes, with fancy stripes of grey, black and blue. When these stockings were finished I turned round and found that while these were being made, only a few inches of stocking had been woven by the lonely weaver on his little machine, and I could not help thinking that he must have felt disheartened when he saw how slowly his work progressed!

A Trip Around India

It was with great reluctance that I left the Palace of Industry, but as I felt I must see something of the other marvels of Wembley, there was nothing else for it but to move on to another building at once. I decided that the most imposing building in sight should be my next objective. This was the Indian Pavilion, which is built in exact imitation of the wonderful Indian Temple at Agra, the Taj Mahal. The courtyard, with its fountain playing and its swinging red lamps in each doorway, impressed me greatly, and at a distance the white plaster was a very close imitation of the marble Taj. Especially was this so when the sun shone on the dome and on the beautiful archways and pillars—indeed it gave me quite an "Arabian Nights" feeling, and I could almost imagine I was far away in India! As I climbed the steps, I came face to face with an Indian, who smiled to see the evident admiration with which I was regarding the building.

As I entered I was greeted by the fragrance of Indian perfumes and by the tinkling of little bells, and all around me were wonderful exhibits. There were magnificent cloth-of-gold and beautiful embroideries, used on ceremonial occasions by Indians of high rank. Rugs of soft texture and delicate shades, of such intricate patterns that a worker often requires a year to finish one rug! Models of temples made of mother-of-pearl and marvellously wrought silver; ivory carvings; brass-ware engraved by hand, some of it inscribed with passages from the Koran. Native furniture—tables and dainty chairs, bureaux and cabinets in different woods.

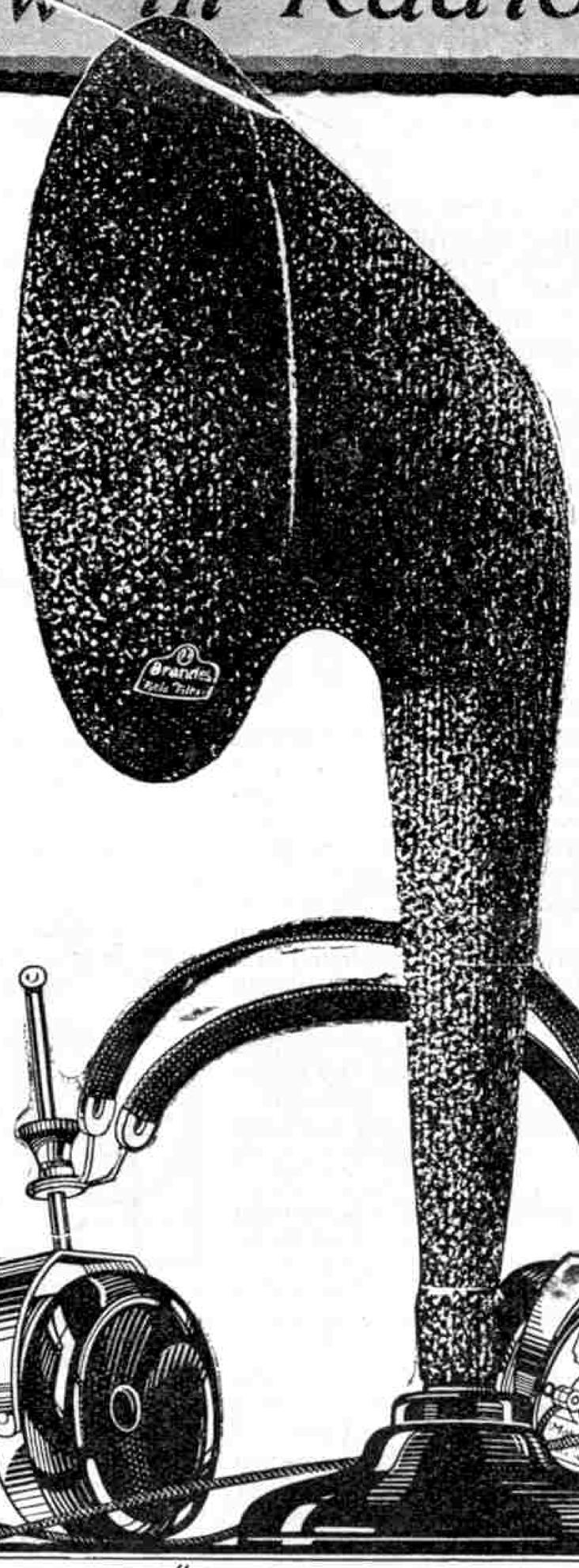
A Costly Casket

Many of these articles were elaborately inlaid with mother-of-pearl, and one cabinet was inlaid with ivory in most intricate patterns of ferns and

(*Continued on page* 289)

Brandes

The Name to Know in Radio



The Table-Talker strikes a "new note!"

DECIDED originality! Original in the real beauty of its performance, original in its ingenious construction, original in its remarkable price. The horn is so contrived that every note registered is encompassed and emitted with absolute purity—there is no discordant echo from its walls. The full-toned accuracy of reproduction is consistent with the mellow note which is the chief characteristic of the famous Brandes *"Matched Tone"* Headphones. No adjustment is required because the exact tone degree is there all the time. Simple lines and a neutral brown finish make it a tasteful and effective addition to your set.

Brandes products are obtainable from any reputable dealer and carry our official money-back guarantee, enabling you to return them within 10 days if dissatisfied.

Matched Tone
TRADE MARK
RADIO HEADPHONES

25/-

Table-Talker
TRADE MARK

42/-



Tune with Brandes "Matched Tone" Radio Headphones Then Listen with Brandes Table Talker

Wembley—(*continued from page* 287)

flowers, every inch being most elaborately carved. Figures of men and of animals, carved in ivory and ebony, were also displayed, and a huge ivory elephant, with gold tusks and trappings and ruby eyes, was being very much admired. Here, too, was a jewel-casket of ivory, richly carved and inlaid with precious stones, a beautiful piece of work, indeed, and carved from a single elephant tusk. It was for sale but I didn't buy it—the price was £400!

There were many little goddesses, who sat with their hands folded looking eternally happy. Some were gilded, and wore precious stones as crowns; others were carved in ivory, and had rings, bracelets, and crowns of rubies and pearls! Everywhere there was the scent of burning "joss-sticks"—scented wood that is burnt slowly as a tribute to native gods. I purchased a bundle of the thin long sticks, that look for all the world like thin coloured tapers, but I don't know what the family will think when I start burning them in my den!



Photo by] [*Campbell Gray*

The Indian Pavilion

In the foreground is seen the head of a moose at the door of the Canadian building.

The Story of Indian Transport

In the next section fascinating India had vanished, as also had its perfumes and gems, giving place to the Indian State Railway exhibit. This consisted of a miniature Pullman car with every conceivable provision for passengers' comfort, including windows fitted with mosquito-nets and wooden shutters for use at night.

Cleverly-modelled scenes showed the difference that railways have made to the health and prosperity of India, commencing with the days when the natives lived in rough huts and used primitive instruments for cultivating the land, and when beasts of burden were the only known means of transport. The scenes showed the rough carts, drawn by two bullocks, which were used before the covered wagons, drawn by horses. The advent of the first railway was shown by a model of the first engine, a queer-looking thing, indeed, when compared with the "*Flying Scotsman*" and one or two of my other favourites! This primitive Indian loco had a contrivance on the chimney something like a huge funnel, and almost gave one the impression that the driver had been filling up the boiler with petrol and left in the funnel by accident!

The models showed clearly how the railway made it possible to bring machinery from the seaport towns to the country, and also how it was possible to transport labour, so that farming conditions improved and irrigation on a scientific basis became possible.

Handling Passengers who Cannot Read

My attention was next attracted by a huge model of a typical wayside station on the Oudh and Rohil Khand Railway in India, its platforms thronged with tiny figures representing natives in gaily-coloured clothes. This exhibit was 36 ft. in length, 15 ft. in width, and nowhere during my tour did I see a more perfectly-proportioned model nor one more interesting.

It seems that on great feast days the Indians attend religious festivals, which occur fairly frequently—in fact there are about a dozen each year. On these occasions the people flock to the big cities and naturally the stations are crowded. Unfortunately many of the people are unable to read or write, and as may be imagined, the booking clerks would have a very rough time under the ordinary system of issuing tickets! To surmount the difficulty the authorities have devised a very ingenious system. Upon stating their destination and paying their fare, the passengers are given tickets of different colours, each religious centre having a distinctive colour. Near to the platforms are large compounds or enclosures, at each of which a flag of distinctive colour is flown. The passengers enter the compound that has a flag agreeing in colour with their ticket, and thus all the passengers for a particular city are in their correct compound, without the trouble of having to read any directions! It is then an easy matter for the gates of one compound to be opened when the train for their destination comes in. Despite the fact that thousands of these pilgrims travel in the course of a day, it is an almost unheard-of occurrence for one to enter a wrong train, which speaks well for the efficiency of this novel system!

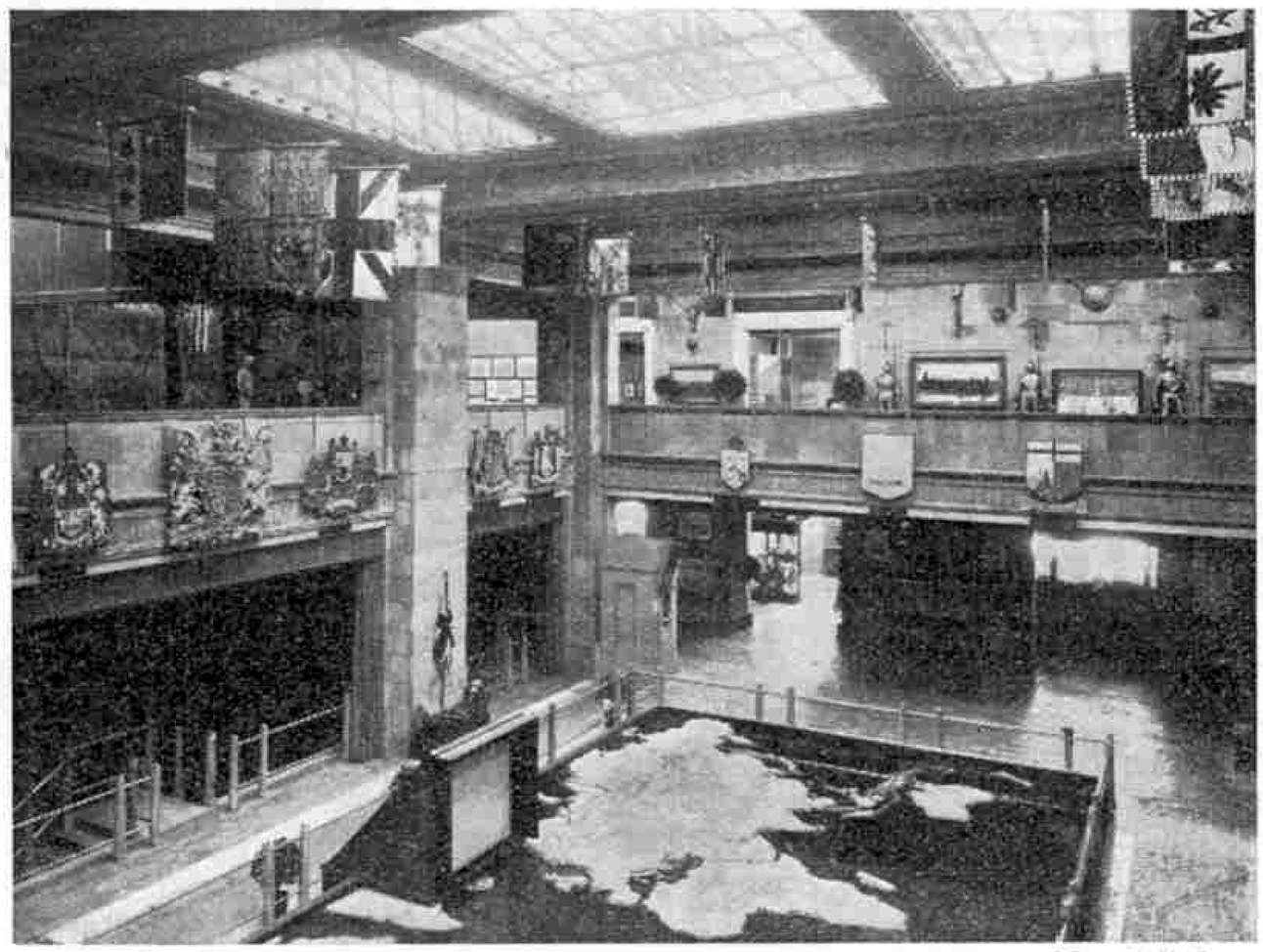


Photo by] [*Campbell Gray*

The Government Building

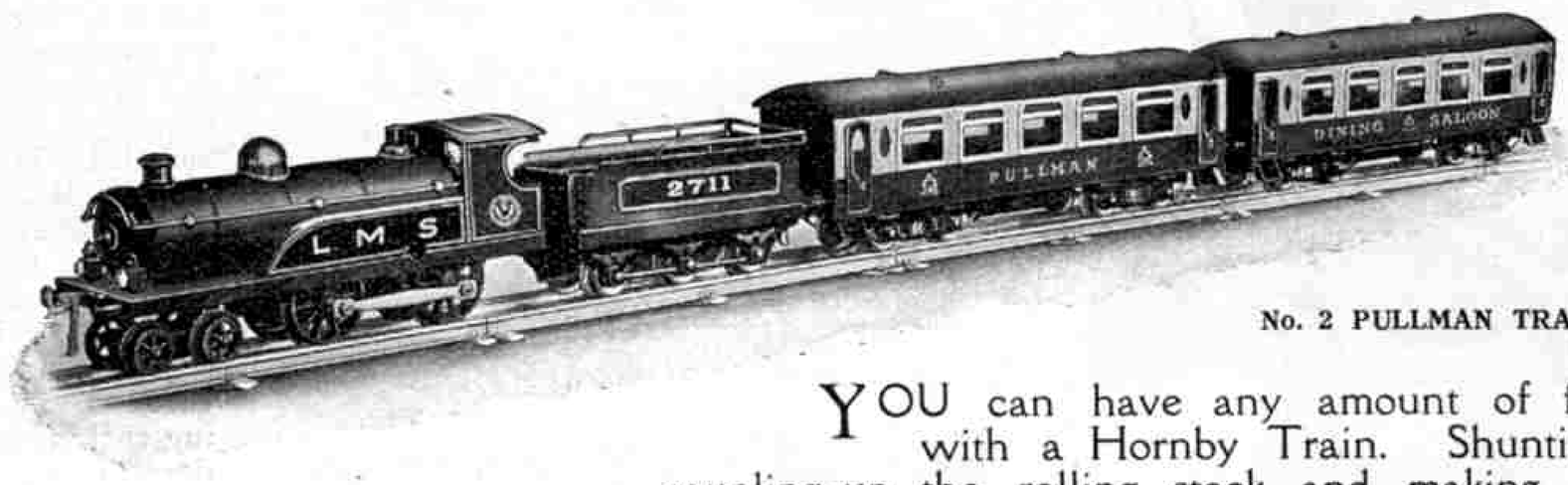
The huge map is seen in the Hall, and on the Gallery, at the left, is the Science v. Disease Exhibit described in this article.

Strange Marriage Customs

Whilst passing through one of the small halls connecting the different sections of the building, I came across an ancient manuscript, elaborately illuminated. I could not understand the original, of course, but beside it was an English translation, from which I discovered that the very lengthy parchment was an agreement of marriage between an Indian Prince and Princess of an ancient family of native rulers. The document was very old but well preserved, and it seemed strange to read of the Prince "graciously accepting the delicate person" of the Princess together with a tremendous dowry of oxen, gems and other valuables. The virtues and beauty of the lady were lauded at great length, and the bravery, nobility and gallantry of her husband-to-be were similarly extolled! I remembered having read that the old Indian marriage

(*Continued on page* 315)

REDUCTION IN PRICES OF HORNBY CLOCK WORK TRAINS



No. 2 PULLMAN TRAIN

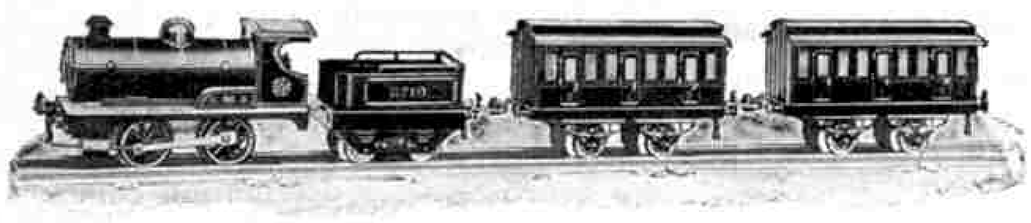
Guarantee

Hornby and Zulu Trains are tested and their efficiency is guaranteed. A form of guarantee is furnished with each loco, and we undertake to repair, or replace at our option any loco that fails to run satisfactorily from any cause, other than misuse, within 60 days of purchase.

YOU can have any amount of fun with a Hornby Train. Shunting, coupling-up the rolling stock and making up trains will give you hours of pleasure. Hornby Trains are beautifully finished, strongly made, and will last for ever. One of their most valuable features is that all the parts are standardised, and any lost or damaged part may be replaced with a new one.

Every train is guaranteed, in accordance with the terms shown above, and you are therefore sure of satisfaction if you buy a Hornby.

A series of articles are now being published in these pages telling you how to get the most fun out of your Hornby Train set. You will enjoy reading them, and if you are not yet the proud possessor of a Hornby Train choose one for your next Birthday present — you will never regret it!



No. 1 PASSENGER TRAIN (new type coaches with opening doors)

HORNBY TRAIN PRICES

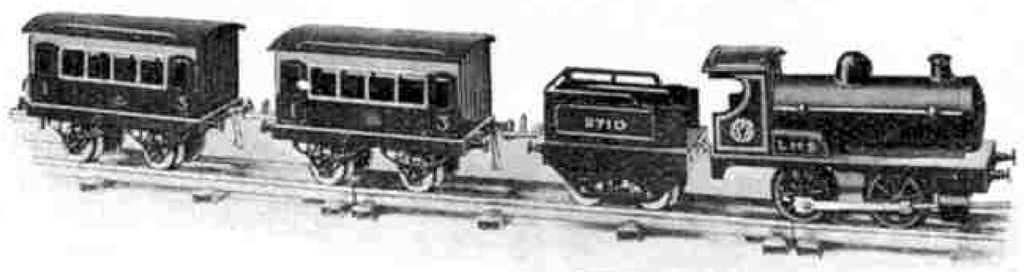
No. 1

Goods Set	22/6	Wagons	each 2/6
Passenger Set	30/-	Tenders	,, 2/6
Locos	each 15/-	Passenger Coaches	,, 5/-

No. 2

Goods Set	37/6	Wagons	each 3/6
No. 2 Pullman Set ...	60/-	Tenders	,, 3/6
Locos	each 22/6	Pullman Cars ...	,, 15/-

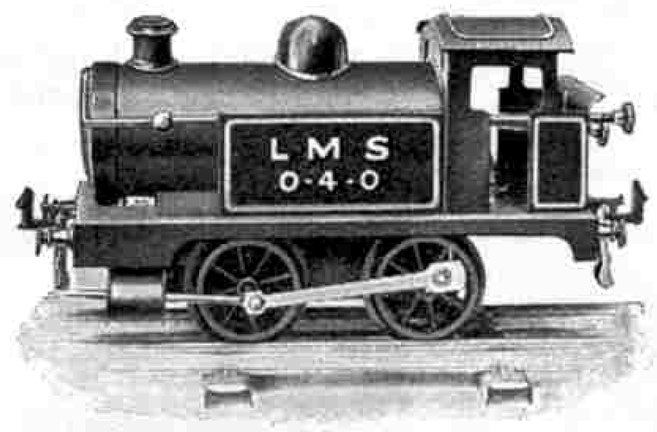
ZULU CLOCK WORK TRAINS



Zulu Passenger Set ...	22/6	Zulu Tenders ...	each 2/-
,, Goods ,, ...	17/6	,, Coaches ...	,, 4/-
,, Locos	each 10/6	,, Wagons ...	,, 2/6

Full particulars of these splendid trains will be sent post free on request.

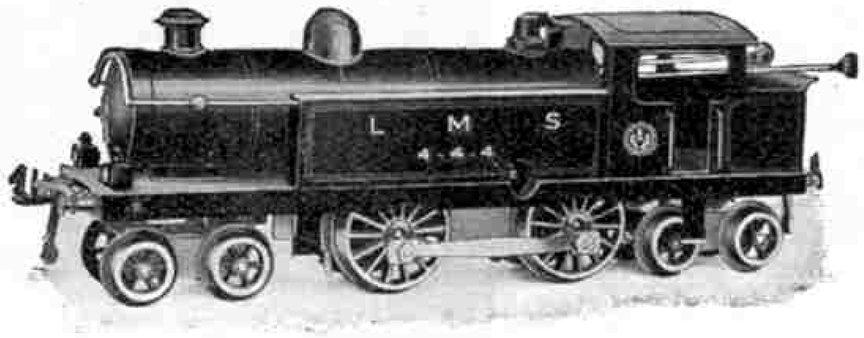
HORNBY TANK LOCOS



No. 1

The Hornby No. 1 Tank Loco is a strong and durable loco capable of any amount of hard work; richly enamelled and highly finished; fitted with reversing gear, brake and governor.

Gauge 0, in colours to represent L.M.S. or L.N.E.R. Companies' Locos 12/6



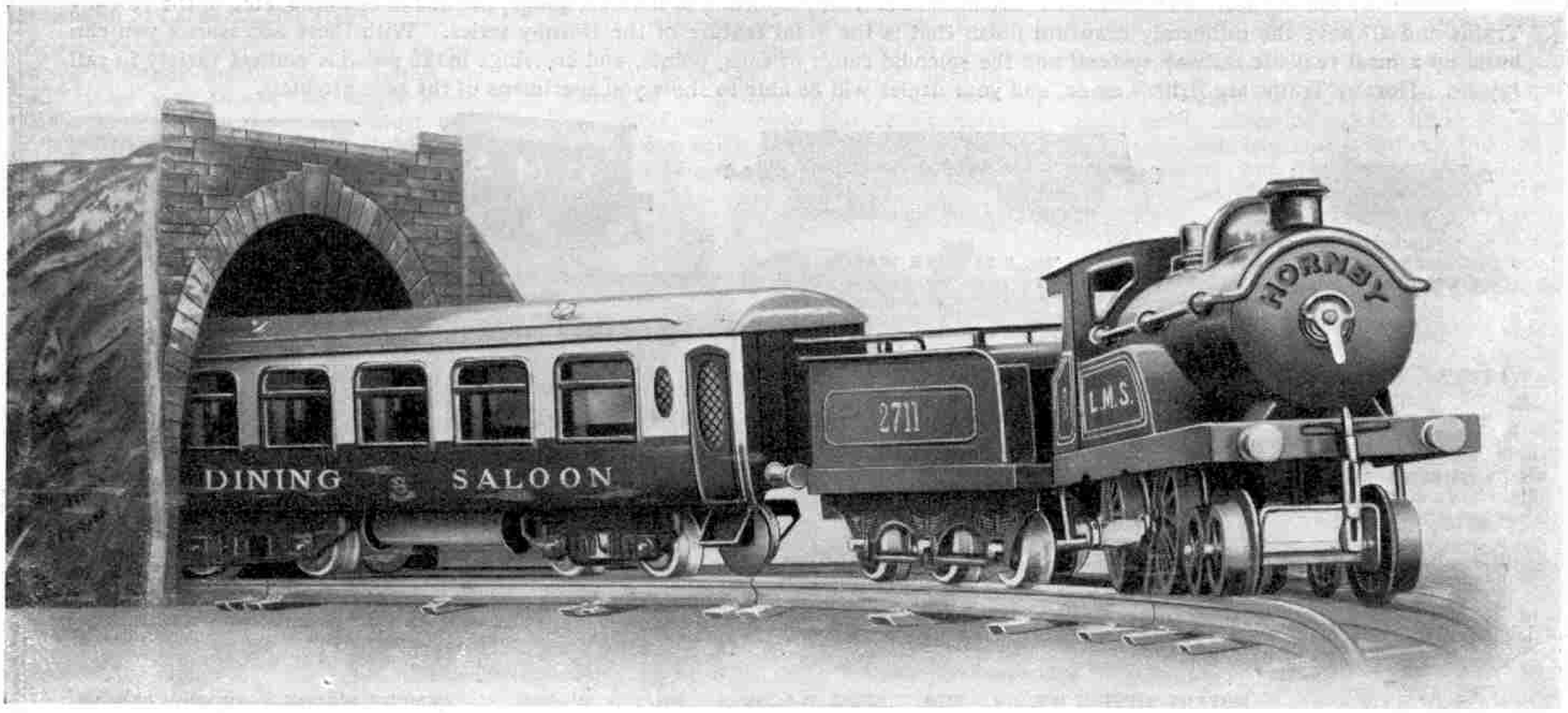
No. 2

The Hornby No. 2 Tank Loco is a powerful model embodying all the characteristics of the Hornby series. It is 11½" in length and is fitted at both ends with a four-wheeled bogey. Beautifully finished in colours; lettered L.M.S. or L.N.E.R., with reversing gear, brake and governor. Suitable for 2 ft. radius rails only.

Price 30/-

OBTAINABLE FROM ALL MECCANO DEALERS

How to Run a Miniature Railway System



These articles, which have been specially written by an expert who has made a life-long study of miniature railways, are intended to show how to get the most fun out of a miniature railway system. A system built up on the lines described will not only be efficient in working and pleasing in appearance, but it will give untold hours of happiness and fun to its owner.

IN spite of the rival attractions of radio, motor-cars and aeroplanes, railways still maintain their fascination, and deep down in the heart of almost every boy there is a longing for a railway of his very own. But it must be a real railway, not just a rickety, foreign-made engine dragging a couple of absurd-looking carriages round and round a small circular track. It must be a correctly-laid-out railway with main line, branch lines and sidings, stations, tunnels and bridges, and fully equipped with points, crossings and signals. A real railway of this kind is easily built from the component parts of the Hornby Train System, and the object of this new series of articles is to show just how this can be done.

Unique Features of the System

The Hornby System has many unique features that place it in a category quite by itself. The clockwork motors are perfect pieces of mechanism with accurately-cut gears that ensure smooth and steady running, and the trains throughout are beautifully finished in every respect and are enamelled in the standard colours of the leading British railways.

Several train sets are available, each consisting of Loco, Tender, two Passenger Coaches or two Goods Wagons, and a set of rails including curves and straights. These train sets are only the foundation of the system, however, and exactly in the same way that the smallest Meccano Outfit may be converted into a No. 7 by the addition of Accessory Outfits, so a Hornby Train Set may be built up into a complete and elaborate railway system by the addition from time to time of various accessories. These accessories include a great variety of Wagons, Bridges, Tunnels, Level Crossings, Signals and Signal Cabins, Water Tanks and all the essential features of a real railway. The track, too, is capable of almost infinite expansion, and the many different types of Points and Crossings enable any desired layout to be developed on sound railway principles.

It is well known that all the Meccano parts are carefully designed so as to take their appointed place in the complete system. Similarly each of the Hornby Train accessories is in perfect proportion to all the others. The result of this is that a layout built up entirely from Hornby Trains and accessories not only works perfectly, but also has a very attractive appearance on account of the symmetrical inter-relation of all its components.

Hornby Locos are Guaranteed

The great confidence of Meccano Ltd. in the perfect mechanism and workmanship of their locos is shown by the fact that they are guaranteed. Meccano Limited will repair or replace, free of charge, any loco that fails to run satisfactorily from any cause other than misuse, within 60 days of the date of purchase.

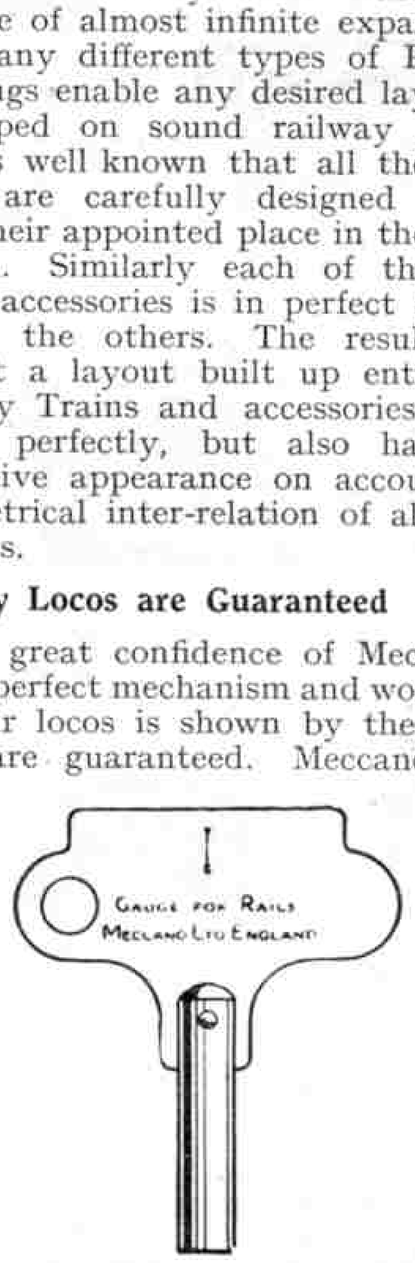


Fig. 1. The top of the Winding Key forms a Gauge for examining the track

Space Available

In contemplating the acquirement of a model railway the first point to be considered is the amount of space available. Some boys are fortunate in having at their disposal an attic or other spare room, where a large track may be laid and kept down more or less permanently. This arrangement is greatly to be preferred, but it is not all who are able to play under such ideal conditions; most boys have to make the best of the floor space of a living room, where the track has to be taken up after use and laid down afresh each time it is wanted. Of course, during the fine days of summer the track may be laid out of doors and great fun may be had in this way, but it is necessary for the rails to be taken indoors at night or they will rust badly, even if no rain falls, for the dew will quickly collect on them.

All Hornby Trains and Rails are gauge 0. In reference to railways the word gauge means the width of the track measured from inside to inside of the heads of the rails. Just as there is a standard gauge for full-sized railways—4 ft. $8\frac{1}{2}$ ins. in Great Britain—so there are various standard gauges for miniature railways. Gauge 0 is the smallest of these standard gauges, and the width of the Hornby Rail is $1\frac{3}{8}$ in.

Although the whole of the Hornby track is thus the same width, it is made on different scales as regards curves. In the larger sets a complete circle made

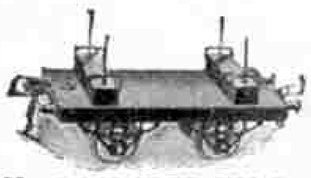
(*Continued on page* 293)

New Rolling Stock and Accessories

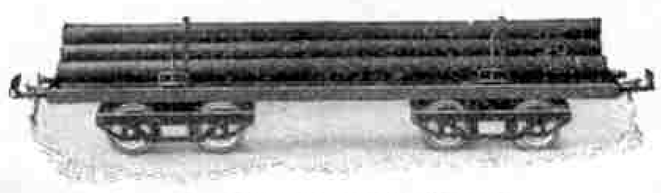
(HORNBY SERIES)

There are now 50 different train accessories—Stations, Signal-boxes, Lamps, Wagons, Level-Crossings, Foot-Bridges, Turntables, etc. Further accessories will be added to the system from time to time, and will be announced in the pages of the "*M.M.*"

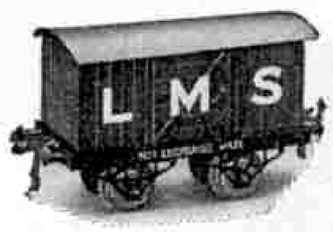
All Hornby Rolling Stock and Accessories are built in correct proportion to the size, gauge, method of coupling, etc., of the Hornby Trains and all have the uniformly beautiful finish that is the great feature of the Hornby series. With these accessories you can build up a most realistic railway system, and the splendid range of rails, points, and crossings make possible endless variety in rail layout. Hornby Trains are British made, and your dealer will be able to show you specimens of the new products.



No. 1 LUMBER WAGON
Fitted with bolsters and stanchions for log transport.
Price **2/–**



No. 2 LUMBER WAGON
Fitted with bolsters and stanchions for log transport. Suitable for 2 ft. radius rails only. Price **5/–**



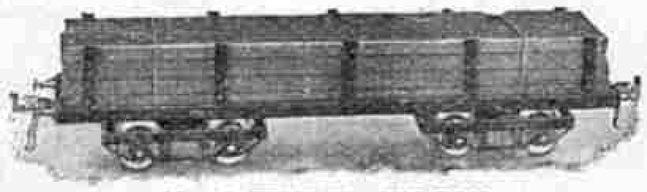
No. 1 LUGGAGE VAN
Representative colours.
Price **4/–**



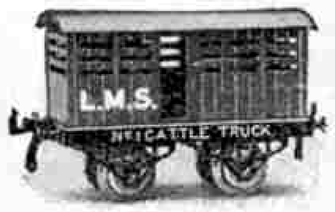
No. 2 LUGGAGE VAN
Finished in colour. Fitted with double doors. Suitable for 2 ft. radius rails only. Price **6/6**



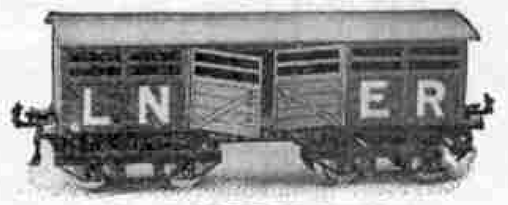
No. 1 TIMBER WAGON
Beautifully enamelled in colour and stoved. Price **2/-**



No. 2 TIMBER WAGON
Beautifully enamelled in colour and stoved. Suitable for 2 ft. radius rails only. Price **4/6**



No. 1 CATTLE TRUCK
Fitted with sliding door. Very realistic design.
Price **4/–**



No. 2 CATTLE TRUCK
Splendid model fitted with double doors. Suitable for 2 ft. radius rails only. Price **6/6**



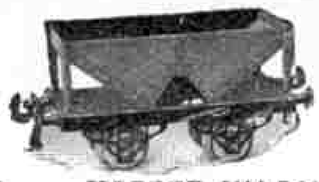
MILK TRAFFIC VAN
Fitted with sliding door, complete with milk cans. Price **4/6**



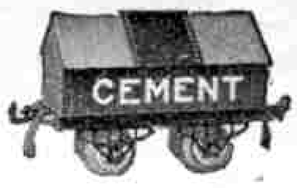
ROTARY TIPPING WAGON
Finished in colour.
Price **4/–**



SIDE TIPPING WAGON
Excellent design and finish.
Price **3/6**



HOPPER WAGON
Mechanically unloaded. Finished in colour. Price **4/–**



CEMENT WAGON
Finished in colour.
Price **4/–**



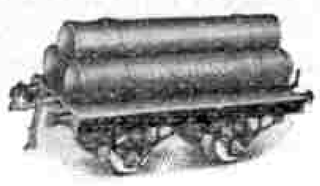
GUNPOWDER VAN
Finished in red.
Price **4/–**



BISCUIT VAN
Price **4/–**



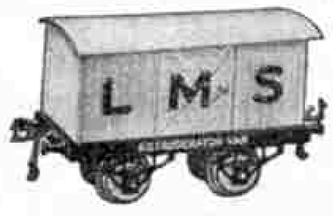
SECCOTINE VAN
Price **4/–**



GAS CYLINDER WAGON
Finished in red, lettered gold.
Price **3/–**



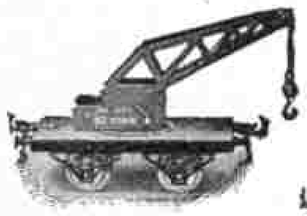
PETROL TANK WAGON
Finished in colour.
Price **3/–**



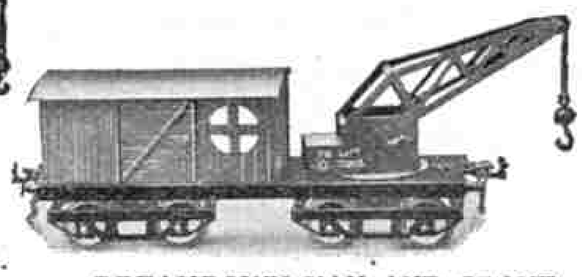
REFRIGERATOR VAN
Enamelled in white, lettered black. Price **4/–**



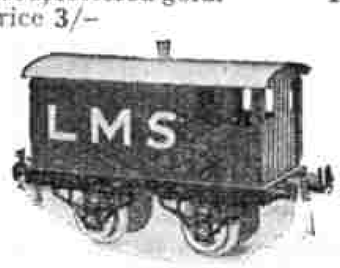
SNOW PLOUGH
Finished in grey, with revolving cutter driven from front axle.
Price **5/6**



CRANE TRUCK
Working model. Finished in colours.
Price **4/6**



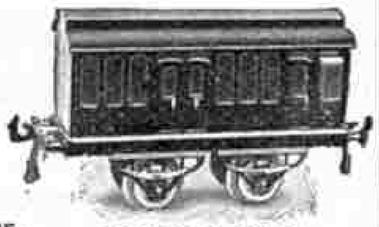
BREAKDOWN VAN AND CRANE
Excellent finish. Beautifully coloured. Suitable for 2 ft. radius rails only. Price **7/–**



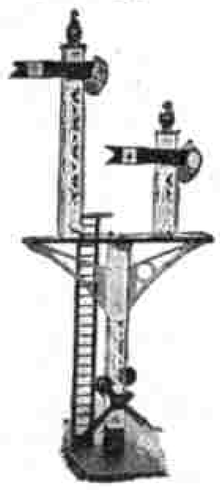
BRAKE VAN
Finished in colour.
Price **4/–**



TROLLEY WAGON. Finished in colour. Suitable for 2 ft. radius rails only. Price **6/–**



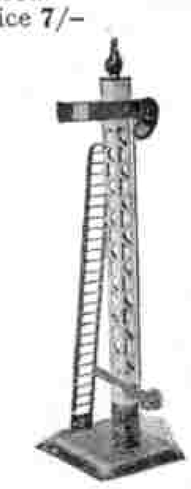
GUARD'S VAN
Price **5/–**



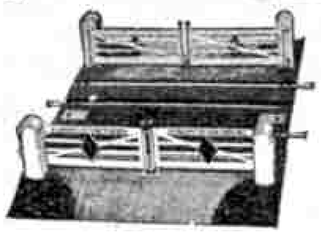
JUNCTION SIGNAL
Signal arms operated by levers at base. Very realistic model standing 14 in. in height. Price **5/6**



SIGNAL CABIN
Dimensions: height 6½ in., width 3½ in., length 6½ in. Finished in colour and lettered "Windsor." Roof and back open to allow signal-levers to be fitted inside cabin if desired. Price **6/6**



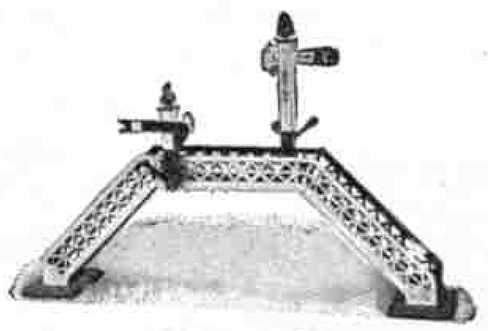
SIGNAL
Price **2/6**



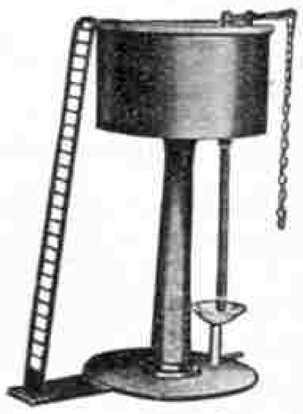
LEVEL CROSSING
Beautifully designed in colour. Measures 11½ in. × 7½ in., with Gauge 0 Rails in position.
Price **6/6**



TUNNEL
Price **7/6**



FOOT-BRIDGE
No. 1. With detachable signals. Price **6/–**
No. 2. Without signals. Price **3/6**
Signals, per pair **2/9**



WATER TANK
Brightly coloured in red, yellow and black. 8½ in. in height, with flexible tube and pump lever.
Price **6/6**



PLATFORM ACCESSORIES No. 1 Price (per set) **2/–**



PLATFORM ACCESSORIES No. 3 Price (per set) **2/–**



PLATFORM ACCESSORIES No. 2 Price (per set) **2/–**

ASK YOUR DEALER TO SHOW YOU SAMPLES

Miniature Railway System—(*cont. from p.* 291)

of the curved rails has a diameter of 4 ft., whereas in the smaller sets the circle is only 2 ft. in diameter. As the straight rails are exactly the same in both sets, it is clear that the amount of space occupied by any particular layout will depend upon the class of curved rails used.

Advantages of Large Radius Rails

Apart from considerations of space there is another matter to be borne in mind. If we wish to use the larger locomotives and rolling stock we must use curved rails of the larger radius. The reason for this is that, on account of their length of wheel-base, the larger vehicles cannot negotiate curves of the small radius rails. On the other hand, the smaller locomotives and rolling stock run even better on the large radius rails than on the small ones. Where they are so affected, the accessory points, etc., are made in both sizes, so that a layout may be made equally complete whichever radius of rails is used.

Before deciding upon which radius rails to use, all the points mentioned above should be carefully considered. If sufficient space is available, and particularly if the track can be laid down permanently in a spare room, there is no doubt about the superior advantages of the large radius rails, especially in permitting the use of the fine-looking No. 2 locomotives with bogies.

What to Buy

Having decided which rails are to be used, the next question is what to buy. Probably, most boys will buy one of the complete sets, each of which contains a Locomotive, Tender, either passenger Coaches or Goods Wagons, and a number of Rails. Then, when quite familiar with the working of this set, they will purchase the remaining pieces necessary to construct a complete railway layout as opportunity allows.

Laying the Track

Let us suppose we have purchased a complete set, either passenger or goods, and are now ready to set it to work. The first thing is to lay the track. The rails are fitted together by inserting the projecting peg at the end of one rail into the hollow railhead of the next. A very valuable feature of the Hornby Rails is the alternate pegs, the advantages of which will shortly become evident. It will be noticed that the sleepers carrying the rails are not flat, but are elevated at one end. The object of raising one rail of the track in this way will also be explained later, but in the meantime it should be noted that the rails must be fitted together so that all the sleepers slope in the same direction.

If the rails were merely pegged together, any movement of the track or an accidental knock would very likely cause two rails to come apart. If this were to occur without being noticed at the time, a very realistic accident would result when the engine reached the gap! In order to make certain that the rails cannot come apart, ingenious locking clips are provided. The clip at the end of one rail fits into a slot in the end of the next, and in this manner the two rails are firmly attached together. It is perhaps a little trouble to fit in all these clips, but neglecting to do so will cause a great deal more trouble later on.

Provided that the track is laid carefully, the train should run along quite smoothly and easily. If it does not do so, there must be a defective place somewhere in the track, and this must be found and made right. An ingenious arrangement has been adopted in order to make the examination of the track a simple and at the same time an accurate process. The back of the handle of the key for winding the loco mechanism is specially designed to the exact inside width between the track rails (Fig. 1). The key thus forms a perfect track gauge, and by sliding it along the track a defective place is discovered at once.

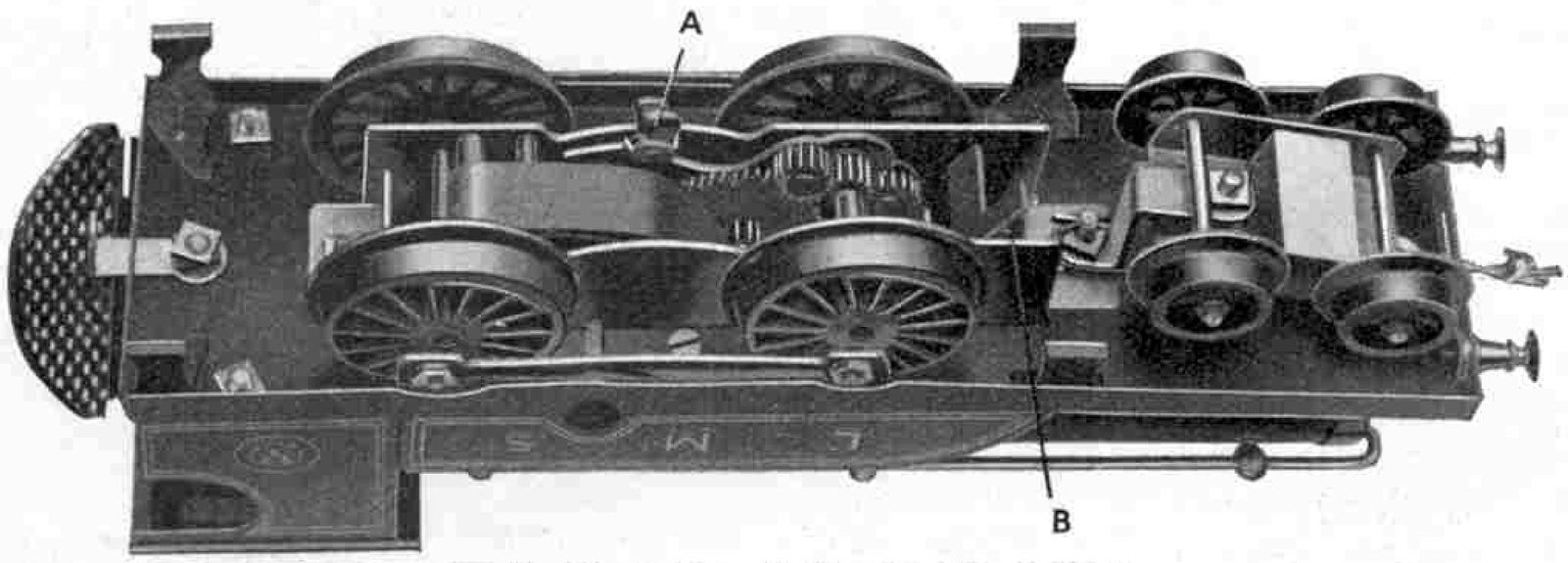


Fig. 2. Underside of Hornby No. 2 Loco

A. Reversing Mechanism. **B. Brake-operating Mechanism.**

Winding Up the Motor

A question that is very often asked by purchasers of Hornby Trains is "How many turns of the key may I safely give in winding up the clockwork motor of the loco?" Anxiety on this point is generally the result of sad experience with cheap Continental engines, the clockwork mechanism of which is liable to collapse from the very smallest overstrain. The clockwork motors of the Hornby locos are very stoutly built, however, and the danger of damaging them by over-winding is remote. It is a perfectly safe plan to turn the key as far as it will go *without forcing*, and you will soon be able to tell when to stop turning by the "feel" of the spring as you wind it.

It is very important to remember that the winding key should never be turned backward, for carelessness in this respect may result in a broken spring. Another point to remember is that the key must be pressed well home and as far as it will go on the winding shaft. When the spring is run down the loco should not be pushed along the track by hand.

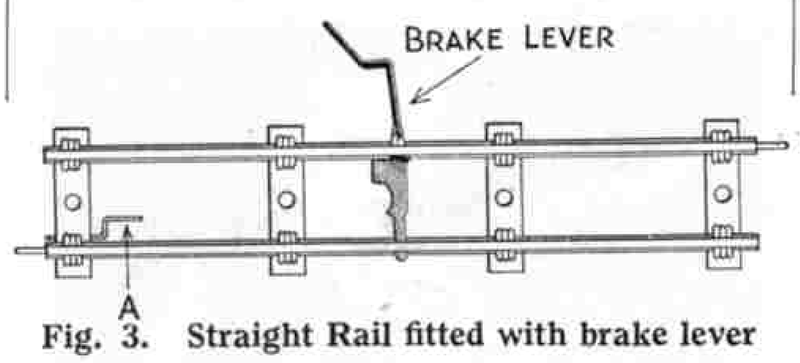


Fig. 3. Straight Rail fitted with brake lever

We now come to the operation of the locomotives, and in order to avoid the possibility of misunderstanding we will take each type separately.

Hornby Loco No. 2

The Locomotive in the No. 2 set is fitted with reversing gear and brake, both of which are controlled by pushing in or pulling out the two levers fitted inside the cab. The lever on the right-hand side of the cab operates the reversing gear, and the one on the left-hand side operates the brake. If the engine is held upside-down in the hand while each lever in turn is pushed in and pulled out a few times, the operation of the mechanism will be readily followed.

These levers must always be pushed fully in or pulled fully out. This is specially important in regard to the reversing lever, for if this is left half-in or half-out the gear wheels cannot fall into mesh, and therefore they are liable to be "stripped" by any attempt to force the locomotive to work.

A very valuable feature of this No. 2 Loco is that it may be reversed or braked from the track, without touching the cab levers. This gives a very realistic effect, and is accomplished by means of a special curved rail included in every Hornby No. 2 Train Set. This curved rail is fitted with trip-pieces operated by two levers, and by pushing these levers inwards and at the same time turning them, the trip-pieces are made to project above the track, and they will remain in that position until turned down again. When these trip-pieces are erected it will be noticed that one is to the right of the centre of the track and the other to the left. Looking along the track from the direction in which the engine is approaching, the trip-piece nearest the right-hand side of the track operates the reversing gear and the trip-piece nearest the left-hand side operates the brake.

Reversing from the Track

Suppose now we wish to reverse the engine from the track. The requisite trip-piece is erected, the clockwork wound up, and the train sent off on its journey. When the loco reaches the trip-piece the latter strikes against a small lever projecting downward from the clockwork mechanism (A, Fig. 2) and forces it along, thus reversing the motor. What actually happens is that the loco travels a little way past the trip-piece, pulls up and then starts to run backward. Immediately the engine has passed over the trip-piece the latter must be quickly lowered again, for if this is not done

(*Continued on page* 311)

OUR MAIL BAG



In this column the Editor replies to letters from his readers, from whom he is always pleased to hear. He receives hundreds of letters each day, but only those that deal with matters of general interest can be dealt with here.

Correspondents will help the Editor if they will write neatly in ink and on one side of the paper only.

G. Alexander (Liverpool).—We agree that many readers would be interested in a cricket column, but until we are able to increase the size of the "*M.M.*" we cannot possibly add a feature of this kind. The name "Meccano" is simply a word coined from the word "Mechanics," and was evolved from the original name, which was "Mechanics Made Easy"—a rather cumbersome title.

G. Gill (Kincardine-on-Forth).—Your cheery letter arrived on a dull, wet morning when everybody was feeling rather grumpy and it did us a world of good. Your riddle is good:—Q. "Why is it foolish to try to light a fire with the '*M.M.*'"? A. "Because it is not dry!" It is never going to be dry, G. G., and there is every reason for your belief that the "*M.M.*" will continue to improve with every issue.

S. Miller (Ahoghill, Co. Antrim).—Your suggested cards would certainly be useful in cases where a Guild member is asked the meaning of his badge, and we shall give the idea serious consideration. As regards your query—"How can a bird fall sitting on a tree?" we haven't the slightest idea unless it is "bough-legged" (Sorry—that is a bad one!). Once we start thinking about this sort of thing, we keep at it night and day, and the kindest thing you can do is to tell the answer at once and put us out of our misery!

L. King (Hyde).—The last sentence in your letter—"I don't think you can beat a Meccano boy unless you use a strap"—exactly hits the reason why Meccano boys are so successful. Whether they are engaged in building a model for a competition, or writing prize essays or worrying over puzzles of some kind, we find Meccano boys have a wonderful spirit of dogged perseverance. This, together with the keen and alert brains that are the result of Meccano training, ensures success in almost all circumstances.

L. Bropley (Stoneycroft).—"Why is a mouse when it spins?" Oh! Leonard, we've only just returned from a holiday and it was raining all the time, and we expected something more soothing than this from the first letter that we opened! We liked the rest of your letter though, very much indeed.

W. T. Castle (Clitheroe).—We read your letter with much interest and we shall be happy to see your article on Model Railways, and if suitable, to publish it. We should much like to examine your "Willowdene Model Railway." The new Hornby Train accessories will help you. Like yourself, most boys derive the keenest pleasure from building up a sound toy railway system.

E. Roberts (Leeds).—"Hysteresis" is a term used in physics to denote a retardation or lagging effect and it has nothing to do with your sister's tendencies! If you were an Editor, Eric, you wouldn't be playing with models and trains *all* the time, and if you only knew what we have to put up with you might never dream of trying to be one. For instance, your friend Simpson "wants to know lots of things about motor-cars and is going to write" to us, and lots of other boys want to know lots of things about lots of other things and they are all going to write to us. It's fine being an Editor, Eric, but it's not easy!

J. Candler (Tulse Hill).—"If there is to be no £250 Competition next year I think I shall die." We hope not, John, but we promise you that if there is no big contest next year, there will be other events that you may find even more interesting and more calculated to save your life and make it happy!

G. Mickleburgh (Bermondsey).—The price of "*Railways Shown to the Children*" is 3/6, and it is published by Messrs. T. C. & E. C. Jack, of Edinburgh. We have noted your suggestions for special articles and will consider them.

A. Cullen (Dublin).—We are glad to hear from you after so long an interval, and we are interested to know of your radio activities. We do quite a lot of listening-in ourselves when we have time. There is no easy method of learning the Morse code—continuous practice is the only way.

R. Hopford (Kurhessen, Germany).—Sorry, but we scarcely think we shall be able to feature conjuring tricks in the "*M.M.*," and most of our correspondents tell us that they prefer the present type of articles to serial stories, which they can get in almost any other publication. A Nature column is much called for, however, and we shall commence one soon. Your suggestion for new Meccano plates has been passed on to the right quarter and will be considered.

Electricity—(*cont. from page* 281)

pipe-lines that run down to the power-house.

Turbines of 30,000 h.p.

The generating plant for this station is being built by Messrs. The English Electric Company, to whom we are indebted for these details of the scheme. Five units are to be constructed, each of which will consist of a twin impulse turbine of 30,000 h.p. driving an alternator generating current at 12,000 volts. These machines will be the largest ever built in this country.

Water Power in Scottish Highlands

Comparatively little has been done to harness water power in England, for here the conditions generally are not favourable for developments of this kind. Considerable progress has been made, however, in Scotland. It is estimated that the waters of the Scottish Highlands are capable of producing over 400,000 h.p., but so far only a small portion of this power has been developed. The British Aluminium Company have a hydro-electric plant at Kinlochleven generating 33,000 h.p. and the company have obtained Parliamentary powers to develop a further scheme which will bring the total up to over 100,000 h.p. Other developments are contemplated, and in a few years something like 150,000 h.p. is expected to be generated throughout the Highlands.

A considerable amount of the available water power in various countries on the Continent has already been developed, and many important schemes are contemplated in the near future. Progress has been most rapid in Switzerland and Scandinavia, where streams and falls exist in abundance.

In this article we have only dealt with water power derived from rivers and waterfalls. Considerable attention is now being devoted to the problem of utilising the enormous power of the tides. The harnessing of the tides demands special methods which are of great interest, and in a future article we intend to describe the progress already made and the possibilities of the future.

A Meccano Champion



Albert Shaw, of Nottingham, winner of the Meccano Championship Cup in Section B of the £250 Model Building Competition. His model of a Twisting Machine is very ingenious, and the award was well merited.

Further Adventures in Meccanoland—

(*Continued from page* 283)

This reminds me that there are lots of good models waiting to be invented. I remember a little while ago seeing in Leeds a large clock in front of which stood the figures of two men. At the stroke of each hour one of the figures struck a bell the correct number of times and the second figure made the same number of strokes on an anvil. I felt at the time that I should be able to reproduce in Meccano these figures and their movements, and I intend to have a try at it, unless some quick-thinking Meccano boy gets in ahead of me.

There were so many thousands of entries in the various sections of the Competition that, in order to get through them in a reasonable time, I could only devote a very few moments to each one, however excellent and novel it might be. At the same time there were a few I did linger over a little, not because they possessed any particular mechanical originality or merit, but because they showed what seemed to me more than usual imagination. In one or two instances the competitors had suggested ideas that might very easily be developed into excellent schemes of play. Mr. Hornby tells me that Meccano boys in steadily-increasing numbers are now building up very comprehensive Hornby Train systems, and many Meccano models are well adapted for use on such railways. Cranes, Bridges, Trucks, Warehouses with elevators, Coaling Stations, Weigh-bridges and Signal Gantries, each a real working model, may all be used and will add a great deal to the completeness of a railway system.

A short time ago I remember seeing in the home of one of my young Meccano friends a most wonderful model of the Forth Bridge, on which had been laid a double track of rails for the builder's trains. Of course, such a model as this requires a very big room, but every boy who possesses a Hornby loco, coaches, wagons and a set of rails can use the smaller Meccano Cranes, Warehouses, etc., with splendid effect. Just take a glance at a model of a Railway Station sent in by Donald Crankshaw, of Nelson, and I am sure you will realise the force of what I am saying. Here we have a complete station with signals, bridge and signal box, all made with Meccano parts and looking most realistic and effective. This is certainly an idea which might be carried much further and I commend it to all my readers who own Meccano and Hornby Trains.

Quite a number of competitors had sent in models of Bicycles, but I did not see anything that seemed to me altogether satisfactory. I am illustrating a typical example entered by F. E. Salom, of Barcelona. This model is nicely proportioned, although I feel sure that many of the details could be greatly improved.

I lingered a long time over the models that had won Championship Cups for their inventors, and I should like nothing better than to build each one by myself with the aid of the photographs and drawings that accompanied them. I wish I had space to go on and tell my readers about each one of them, but I am afraid I have already exceeded the space at my disposal. Anyhow, Mr. Hornby informs me that all the Championship models will be built up, photographed, described and published in the *Meccano Magazine* in due course, as soon as opportunity allows this considerable task to be undertaken.

A DOUBLE-ENDED LOCO

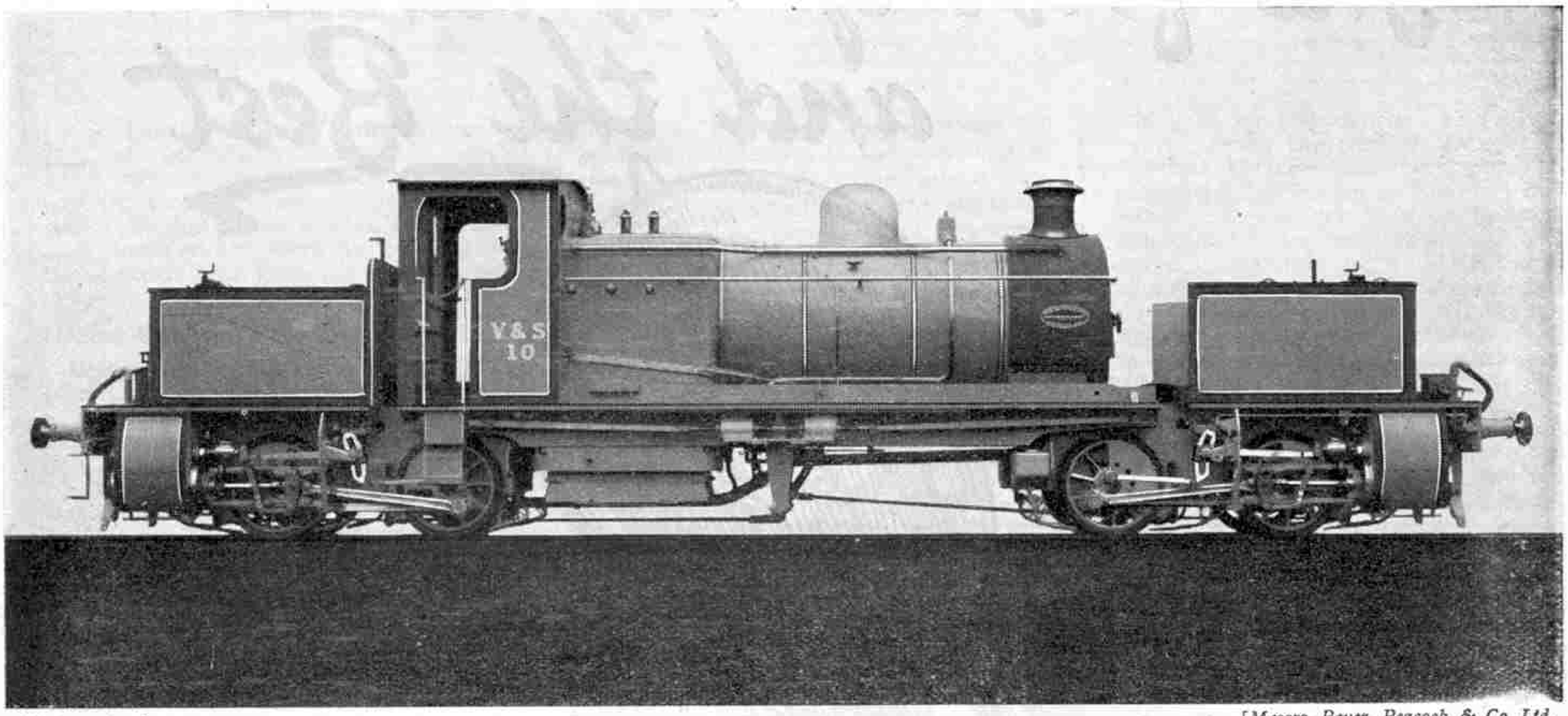


Photo courtesy] [*Messrs. Beyer, Peacock & Co. Ltd.*

Our illustration shows a powerful 0–4–4–0 Garratt locomotive which is giving excellent service on a Works Railway. This loco regularly traverses 97-ft. radius curves and hauls 150-ton trains up gradients of 1 in 20.

ONE of the most remarkable features of modern locomotive development is the manner in which abnormal requirements have been met by the ingenuity of designers. Among the most interesting of the many types of special locomotives embodying such devices is the Garratt articulated loco.

The primary purpose of articulated locomotives in general is to provide for easy negotiation of difficult curves. While this is, of course, a valuable feature of the Garratt, its main object is to provide a range of power that cannot be attained with the more conventional type of loco.

Turn-tables Eliminated

The Garratt consists of two separate engine units connected by a frame carrying the boiler. These units are placed one at each end of the boiler frame, so that the latter is left quite free for the accommodation of the boiler. The result of this arrangement is that the size of the boiler is limited only by the loading gauge, as the fuel and water are carried on the engine frames.

There are no axles beneath the firebox, so that this can be made of any depth and volume within reason, with correspondingly good steaming qualities and fuel economy.

These engines are "double-enders," in fact as well as in appearance, for they will run equally well in either direction, thus avoiding the necessity for long turn-tables. Reversing is generally done by screw-gear, but in the largest engines steam reversing-gear is used instead. Steam-operated brakes are fitted, with hand-braking in addition for the rear unit, and both units are provided with sanding apparatus.

Water-Tank and Boiler

The rear tender carries a combined water-tank and fuel-tank, the shovelling plate of the latter projecting into the cab. The front unit carries a plain water-tank, and the two tanks are connected by a levelling pipe carried along the outside of the girder frame, with flexible connections to the pipes beneath the tanks. Either tank can be isolated if required.

In meeting the growing demands for engines of greater power, designers were always faced with the difficult problem of providing a boiler that would fulfil requirements. The result was the building of boilers with very long barrels, which were both expensive and unsatisfactory. The Garratt loco solves this problem completely, for its boiler can be made equal to all demands, at the same time being built on the simplest possible lines.

The First Garratt

Having briefly outlined the general characteristics of Garratt locos, it will be of interest to turn to particular engines and their work. The first Garratt was designed and built in 1909 by Messrs. Beyer, Peacock & Co. Ltd., for the 2 ft. gauge line of the Tasmanian Government Railways. This loco was necessarily of comparatively small size. It was of the 0–4–4–0 type with compound cylinders—high pressure 11 in. by 16 in., low pressure 17 in. by 16 in. Its wheel diameter was 2 ft. 7½ in., and its total weight, full, 33½ tons. At 75 per cent. boiler pressure it had a tractive effort of 14,334 lbs.

This loco proved very satisfactory, and was followed by larger Garratts, specially designed to meet a variety of difficult requirements on the main line, which had a gauge of 3 ft. 6 in. The weight to be hauled and the speed demanded, together with the restrictions in regard to axle-load and fixed wheel-base, made it impossible to obtain successful results from the ordinary type of locomotive, and the Garratt was the only solution.

Garratts Used in Africa

Since that time the progress of this type of loco has been rapid, notably in Africa on those lines that have limitations as regards track gauge and axle-load similar to those existing in Tasmania. Recently two engines have been built for the Trans-Zambesi Railway for general service on a line 175 miles in length. The gauge of this line is the standard South African gauge, 3 ft. 6 in. The motor trucks of these two locomotives are each of 2–6–2 formation, and the total wheel-base is 56 ft. 8 in. with a rigid wheelbase of only 8 ft. The firebox is of a specially deep type and is designed to burn wood fuel.

The original locos on this line were of the ordinary 4–8–0 type and they hauled loads of from 300 to 350 tons, whereas the Garratt engines are capable of hauling from 600 to 700 tons. Although their tractive effort is so great—about 31,250 lb. at 75 per cent. boiler pressure—the axle-loads are only about 10½ tons. The boilers are of the Belpaire type. The cylinders are 15 in. in diameter by 22 in. piston stroke, and are fitted with inside admission valves with Walschaerts gear. The leading tank carries 2,000 gallons of water and the rear tank 1,000 gallons, and the full weight of the engine is 95½ tons.

Other African railways have adopted the Garratt as being the most efficient locomotive for their requirements, and at present there are about 60 of these engines either actually running or under construction.

(*Continued on page* 313)

The first of its Kind— and the Best



The B.T.H. B 4. VALVE

The B.T.H. Type B4 Valve was the first valve taking only 0.25 amperes at 6 volts sold in this country and is acknowledged as the supreme valve for use as a Low Frequency power amplifier for loud speaker work.

It has an exceedingly high amplification factor and low resistance, is noiseless and free from distortion and has great mechanical strength. It is made by the B.T.H. Co. Ltd., who possess unrivalled facilities for the manufacture of drawn tungsten filaments under exclusive *B.T.H.* patents. It is exhausted by a special *B.T.H.* process which ensures a perfect and permanent vacuum.

Obtainable from all Electricians and Wireless Dealers

A 40 amp. hour 6 volt accumulator will operate 2 B4 valves 4 hours per day for 20 days on one charge

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2168

How Wireless Valves are Made

An Industry of Marvellous Exactitude and Efficiency

LAST month we dealt with the making of the bulb containing the anode filament and grid, and we learned how the electrodes were mounted in the stem. In this instalment we are to consider the detailed work in building up the elements that form the essential part of the valve and are contained in the bulb.

Making the Grid

Before the mount can be built up completely, the grid must be made. This is a very important operation. In the B.T.H. valves, the grid consists of a spiral of molybdenum wire, which is supported by another wire also of molybdenum. Each turn of the spiral is either lashed by this wire to the support, or welded to it by electricity.

We were surprised to find that the whole of the work in connection with the manufacture of B.T.H. valves is carried out by girls. It was wonderful to see how accurately their delicate fingers manipulated the minute detailed work of making the grids and of welding the wires in position, and then it was that we ceased to wonder why girls were employed in preference to men!

The wires are wound on the grids by little hand-machines, the number of turns of wire in the spiral and the length of the grid itself being checked carefully before it is built into the valve, for it is very important that the turns of wire in the grid should be evenly spaced. The same care is exercised in selecting the wire used for making grids, for the diameter of the wire used, as well as the diameter of the grid itself, must be kept exactly to the dimensions that have been previously determined to be the most suitable for each particular kind of valve.

Mounting the Electrodes

In the next process the electrodes are brought into position, and at this stage of manufacture great care must be taken, for many of the faults that develop later may be traced to lack of care in mounting the electrodes. The nickel anode is usually mounted first by means of an electrical welding machine. This welds the anode to the correct nickel wire that projects from the "pinch," or glass tube, by which the welds are held. The grid is next placed inside the anode and is welded to the appropriate lead. After this has been done, the filament, which is usually a straight piece of tungsten wire of specified diameter and of carefully-measured length, is introduced down the grid and the ends are secured to the two nickel supports.

The mount is now complete except for special treatment in the case of some particular types of valves. In these the valve at this stage is dipped in, or painted with, a mixture of chemicals generally termed a "getter," the use of which will be explained later. If the mount is so treated, it is placed on one side to dry, and then the positions of the electrodes are adjusted so that the grid and anode are concentric, or evenly placed, and the filament is adjusted until it is centrally situated within the grid.

Sealing and Evacuating the Bulb

When the mount is dry, with the electrodes correctly adjusted, the next process is to seal it in the bulb, and this is accomplished by placing the mount on a peg of a sealing-in machine. A number of these pegs are fixed vertically on the outer edge of a horizontal disc, some two or three feet in diameter. An operator places the mount on a peg and slips over it the bulb. The disc carrying the peg then moves a short distance, bringing the cylindrical portion of the bulb into a gas-fire, which so heats the glass that it falls inward round the bottom end of the stem, and thus seals the mount in position inside the bulb with an air-tight joint. The disc with its pegs rotates continuously, stopping only a few seconds as each peg comes before the operator, so that there is a constant stream of mounts being sealed in their respective bulbs. The operation is accomplished in almost as short a space of time as it has taken to describe it.

On leaving the sealing machine the valve is next submitted to an exhausting process, by which all the air is removed from inside the bulb. This is another very important process of manufacture, and calls for considerable judgment and experience on the part of the operators.

When a valve has been completely exhausted it is known as "hard," while a valve that has not been so thoroughly exhausted is termed "soft." If a soft valve is correctly handled by the user of a receiving set it may make an efficient detector, but if used for amplifying it will not give satisfactory results. Valves employed for amplifying purposes require a very high degree of vacuum. To obtain this the valves are heated to a high temperature while connected to a powerful vacuum pump by the short length of glass tubing that has remained attached to the top of the bulb since it was blown at the very first stage in its career.

Eliminating the Gases

During the exhausting process it is necessary not only to exhaust the air, but also to drive out the gases contained in the metal of the electrodes and later to absorb the residue of these gases when the bulb is sealed, so that a permanent high vacuum will be maintained. This is accomplished by passing a current through the filament of the valve while the anode and grid are maintained at a high positive potential, by which they are thus subject to bombardment by electrons from the filament. As a result the anode and grid become very hot, and the chemicals with which the valves are painted become deposited on the walls of the bulb, in which position they gradually absorb the gases driven out of the electrodes by the heat. In some cases a different procedure is adopted and a special "getter" is used. When the anode becomes hot the "getter" volatilises and is deposited on the bulb as a fine coating of silvery metal, making the glass of the bulb something like a mirror.

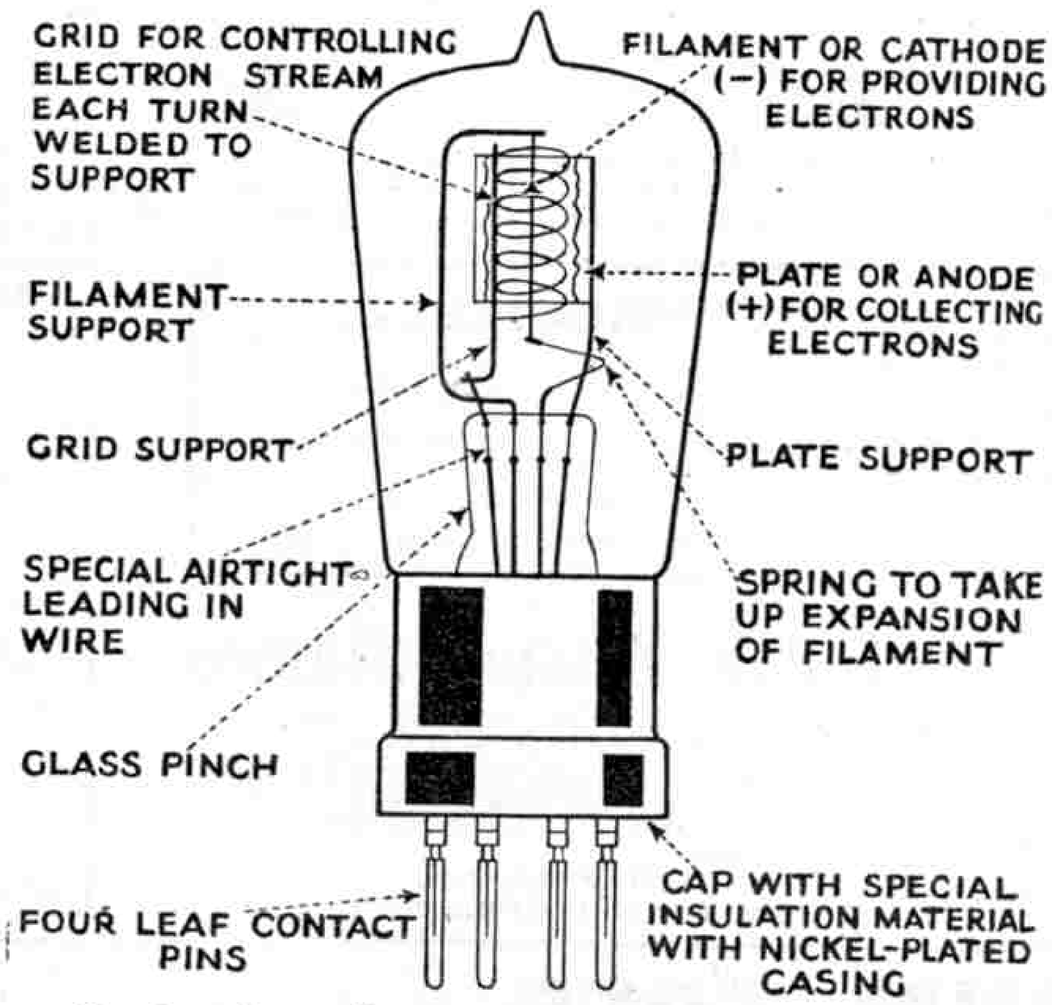
In either case the pumps exhaust most of the gas that is liberated from the electrodes, but the process is completed by the volatilisation of the "getter," thus ensuring a very hard vacuum.

When the exhausting process has been carried out completely the bulb is sealed by closing the tube through which exhaustion has taken place. The tube is heated and twisted off, leaving on the bulb the characteristic "pip" or sharp point with which we are all familiar.

Careful Testing

The exhausted bulbs with their electrodes sealed inside are now ready for finishing off, and as a preliminary are fitted with a nickel-plated shell, to which they are fastened by a special insulating paste. The standard four-pin plug is fitted inside the shell, the copper wires connected to the electrodes being threaded through the holes in the disc beside the pins.

(To be continued)



The above diagram illustrates a B.T.H. valve of the R Type in which the filament is of pure tungsten, the grid a molybdenum spiral, and the anode nickel. This type of valve works well as a detector or amplifier, the normal working voltage on the anode being 20 to 80 volts and on the filament 4 volts with a consumption of approximately 0.63 ampere.

Stamps for Sale

(*See also page* 308)

SET OF 10 TRAVANCORE FREE to applicants for approvals. Try my ½d. Booklets.—S. Huckle, 53, Birkenhead Avenue, Kingston-on-Thames.

FREE. 50 Stamps, all different, to approval applicants for my famous sheets, all ½d. each.—Scott, 154, Wellesley Road, Ilford.

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STAMPS. Large number mint and used British Colonials, also Persian and other foreign at bargain prices. Selections choice copies, priced separately, on approval.—Collector, 31, Kensington Gardens, Bath.

STAMPS. Dispersing large collection into 1/6 job lots.—Auerbach, 85, Church St., Barrow, Lancs.

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ALL BUYERS from my approvals will receive FREE Gifts. Send for selection now. You will not be disappointed.—Negus, Bury, Huntingdon.

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STAMPS! Collectors should not fail to send for our famous approvals. Liberal discounts on purchases.—Fairweather, 64, Barker Street, Lozells, Birmingham.

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STAMPS. Dispersing Collection 22,000 (also Collection entire £1 and £25). Approvals 8d. and 9d. in 1/– discount, cash or exchange Meccanos or anything useful.—"Olivet," Stretton Road, Addiscombe.

NONE FREE—NONE AS CHEAP!! Farthing Stamp Approvals; about 1000 sent.—J. V. Wyk, 439, City Road, Old Trafford.

Unique Approvals, choice varied selections, attractive sets, free perforation gauge. Send 1½d. postage to-day. The Malvern Stamp Depot, Wychcot, St. Andrew's Rd., Malvern.

"THE PHILATELIC MAGAZINE," 46, Victoria St., London, S.W.1. Best stamp newspaper. Order from your newsagent. 3d. fortnightly, or send 4d. for specimen and bonus form worth 2/6. Album catalogue free.

JAPANESE EARTHQUAKE STAMP, JOHORE, Chinese Turkestan, Thrace, Poland (new gold currency), Fiji, etc.; altogether 60 different 3d., if approvals requested. (9d. without or abroad). 50 Zoological, 6d.; 25 Bulgaria, 6d.; 1,000 mixed, 1/6.—M. Holloway, 28, Heyburn Road, Liverpool, E.

FREE. 20 Different Stamps including Belgium King with Steel Helmet obsolete. **1,000 Stamp Mounts,** Duplicate book and perforation gauge with watermark detector. To approval applicants sending 3d. for postage.—Henri Loufs (Dept. M.M.2), Grand-Hez, Muno (Belgium).

BRITISH COLONIALS, 200 different, 3/9; 500, 15/–; 1000, 55/–; or a selection sent on approval at ½d. each. Colonial Mixture including high values, 3/– per 1000.—Theobald, 54, Antill Road, London, N.15.

COLONIAL WAR STAMPS, 50 different, including War Tax Canada, Jamaica, New Zealand and Ceylon War Stamps (Cat. 5/–) for 3d. only.—W. A. White, 6, Stourbridge Road, Lye, Worcs.

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Set of 10 English, various issues (½d. to 10/–) including one in use over 80 YEARS ago, GIVEN FREE of charge to applicants for approval sheets. (Special discount to Agents). If 2d. postage is enclosed either a set of PICTORIAL GAMBIA or FIJI or 1,000 STAMP MOUNTS also given FREE, or the 3 sets and stamp mounts for 6d. postal order.
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DON'T READ THIS
unless **U** want the best and cheapest approvals. So different from others. **No Rubbish. No Fancy Prices.** A few good class stamps free to every applicant. Paterson, 19, Dorset Avenue, Rusholme, Manchester.

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5 Dutch Indies different to every applicant for approvals at ½d. per stamp, real good value; or for 1,000 Superior Assorted 1/–.—Gall, 37, The Avenue, Durham.

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A BIG REWARD
awaits **Meccano** readers who send us their name and address on a postcard, in the shape of our **ILLUSTRATED GUIDE FOR STAMP COLLECTORS,** with full details of our splendid albums, etc., our **BARGAIN PACKET AND SET LIST,** printed in colour, and a sample copy of that fine stamp Mag. (with special "Junior" Section), **Stanley Gibbons Monthly Journal.**
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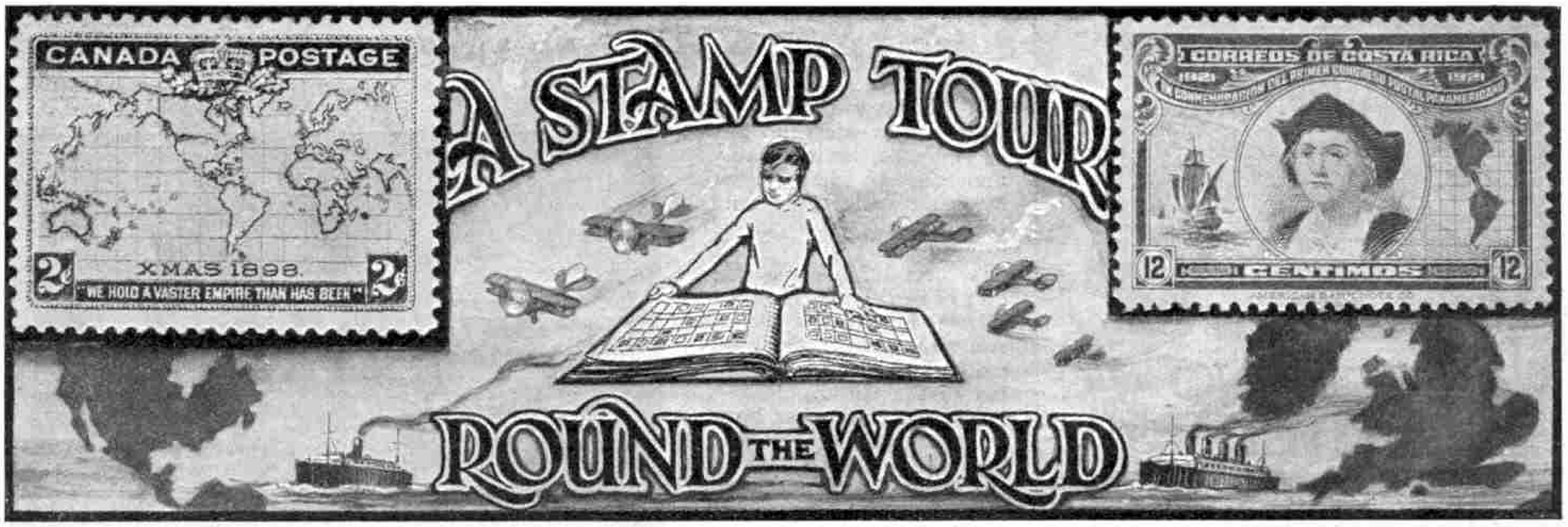
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20 different stamps, including BARANYA (Servian Occupation), THRACE, Greece, CROATIA, Servia (King Peter), Montenegro, Bulgaria, Turkey (War Pictorial), Jugo-Slavia, EPIRUS (Flag) will be sent FREE if you enclose postage and ask to see my APPROVAL SHEETS (Abroad 4d.). PRICE LIST FREE.
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MANY RARE STAMPS have been found by purchasers of **THE "DIAMOND" PACKET,** which is guaranteed to contain **1,000 Unsorted Stamps** 1/3 (from Convents abroad). 2 packets, 2/5; 3 packets, 3/6; 4 packets, 4/6; 5 packets, 5/6. All post free. (Abroad 3d. per packet).
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II. NEWFOUNDLAND, CANADA AND UNITED STATES

LEAVING Liverpool and home far behind, and passing southward down the Irish Sea, we reach the open waters of the great Atlantic. It is about 2,000 miles to Newfoundland, the first country on our long list, and so we shall have plenty of time during the voyage to make a survey of our floating home. We examine the wireless cabin; the bridge, with its wonderful control instruments; we explore the ship's stores and the hold and spend some time with the look-out. But what interests us most is the engine-room with its great turbines, and close at hand the huge boilers and furnaces. With all these attractions the time quickly passes until one morning we are greeted with the news that Newfoundland is in sight. Eagerly we make our way to the bows to catch our first glimpse of the American continent, and we feel that our tour has indeed really commenced.

The Newfoundland Coast

The coast of Newfoundland is bleak, rocky and barren. The



brown cliffs, some 300 ft. in height, stretch to the right and to the left as far as the eye can see, broken here and there by deep inlets similar to the fjords of Norway. We pass through one of these inlets, called "The Narrows," about one-third of a mile wide and flanked on each side by hills 600 ft. in height. As we proceed we find that the inlet narrows to 600 ft., and turning suddenly at the end of this stretch we are at St. John's, the capital of Newfoundland. Here we board the waiting fleet of aeroplanes to make a tour of the island. Quidi Vidi Village (1923, 8 cents) is reached and passed and soon we arrive at Placentia, 63 miles from St. John's. Placentia, the old French capital, is a small sea-port on the eastern coast of Placentia Bay and is one of the principal



centres of the herring fishery. It is prettily shown on the 20c. value of the current pictorial series, this particular value having been issued only a few months ago.

Flying northward we pass over the south-west arm of Trinity (1923, 2c.), the coast here being typical. The 5c. value of the same series shows a nearer view of the cliffs. It was here that the U.S. "Niagara" landed the American end of the first Atlantic telegraph cable in August 1858. Continuing along the coast we arrive at Cape Bonavista, "the landfall of Cabot," as the 3c. of the 1897 issue states. The set of stamps to which this belongs was issued to commemorate the 400th anniversary of the discovery of Newfoundland by John Cabot, whose portrait appears on the 2c. value. The 1c. of the same set also commemorates the 60th year of the reign of Queen Victoria.

The Paper-Mills

Flying westward and inland, we come to the Grand Falls on Exploits River. These are near to Newfoundland's only railway, which runs from St. John's to Port-aux-Basques in the extreme S.W. of the island, with a short branch to Placentia. The Grand Falls form one of the most impressive sights of the island and are well shown on the 10c. stamp of the 1910 issue. In the foreground are the paper-mills that make vast quantities



of paper, chiefly for newspapers, from wood-pulp.

After proceeding about 60 miles in a north-westerly direction we come to the Humber River and follow its course for nearly fifty miles to its mouth. On the way we pass many beauty spots, such as are shown on several values of the 1923 set. The 4c. shows a "Quiet Nook," the 6c. the "Upper Steadies," the 10c. the "Humber River Canon," and the 15c. "Near the Little Rapids." On all these stamps we see the beautiful hills and woods that are typical of the magnificent scenery of the country. At the mouth of the Humber is the Bay of Islands, of which we are given a glimpse on the 12c. stamp of the same issue. This stamp also shows the curiously-shaped hill named Mount Moriah.

Now our visit to Britain's oldest colony is finished and we turn southward to rejoin our ship, which has been skirting the south coast of the island while we have been journeying inland.

Canada and Quebec

Our stay in Canada is of short duration, for we shall only visit Quebec, a city that is the destination of most of the Atlantic liners that sail up the river St. Lawrence. Quebec, which is built on the north bank of the river at the point where it is joined by the St. Charles, celebrated the tercentenary of its foundation in July 1908. Canada commemorated the occasion by issuing a handsome series of stamps, which seem to be becoming rather



scarce. At the present catalogue prices they should be well worth obtaining, since a considerable rise in prices seems inevitable.

Jacques Cartier, who is portrayed on the 1c., was the first known white man to visit Quebec. He founded a large Indian village at this point in 1535 and gave it the name of Stadacona. Samuel Champlain, whose portrait is also on the 1c. stamp and whose house is shown on the 5c. illustrated here, founded the present city in July 1608.

A view of Quebec is shown on the 10c. stamp, which is one of the handsomest stamps ever issued, the engraving being almost microscopic in its detail, and under a strong magnifying glass its full beauty may be seen and studied.

(*Continued on page* 313)



THE MECCANO GUILD

The Secretary's Notes

This month will see the opening of the First Winter Session of 1924 for the majority of Meccano Clubs in this country. A few have already held their first meetings and, judging from their encouraging reports of attendance, a very successful session should be assured.

A valuable hint on club management was recently given to me by the Leader of one of the foremost clubs in this country.

A Leader's Suggestion

As it deals with a means of increasing club funds, the suggestion should prove of interest to most Club Leaders. My correspondent for several years past has made a practice of sending out a number of circular letters to the leading residents in the district. These letters, which may be printed or duplicated, give a short account of the club's institution and activities, and invite the recipient to become an Honorary Member of the club at the cost of a small subscription, 2/6 a year in this particular case. Honorary Members are entitled to visit the club at any time during the Session, and when the good work of the club is realised, a practical interest in the club's future is almost invariably taken. The club in question obtained nearly £10 last year from this source alone, and I strongly recommend the adoption of this scheme by other clubs.

Club Membership Cards for the Winter Sessions are now available, and Club Secretaries should make prompt application for supplies, stating the number of members on the club roll. For the information of newly-affiliated clubs I would say that these membership cards are neatly printed in green, and in addition to setting out the Guild Rules, contain space for the insertion of the club programme. Club membership cards are supplied free of charge to every affiliated club, one being provided for each member.

Secretaries! Please Note

Numerous clubs will, no doubt, decide to run a football team during the autumn and winter months, as was the case with many last year. It has been suggested on several occasions that a Meccano Football League should be instituted and a Challenge Cup offered to the winning team. While this suggestion is one that we hope to be able to adopt at some time in the future, there are several difficulties in the way at present, chief of these being the question of distance. In the majority of cases the Meccano Clubs are so far apart that the journey for the visiting team would be far too long and expensive an undertaking. As new clubs are being formed almost every month, however, this obstacle will eventually be overcome, and then it will be possible to establish a Meccano Football League.

Meccano Football League

Meanwhile, there are several clubs in certain parts of the country that are within easy distance of each other. Edinburgh, Kilmarnock, Glasgow, London, Birmingham, Surrey, South Yorkshire and Lancashire all boast a number of Meccano Clubs, and I shall be very glad to send full particulars to any Leader or Secretary wishing to arrange inter-club matches. A Guild map will be published shortly in the "*M.M.*" showing the locality of every Meccano Club in the country, and reprints will be available for use in club-rooms.

A Guild Map

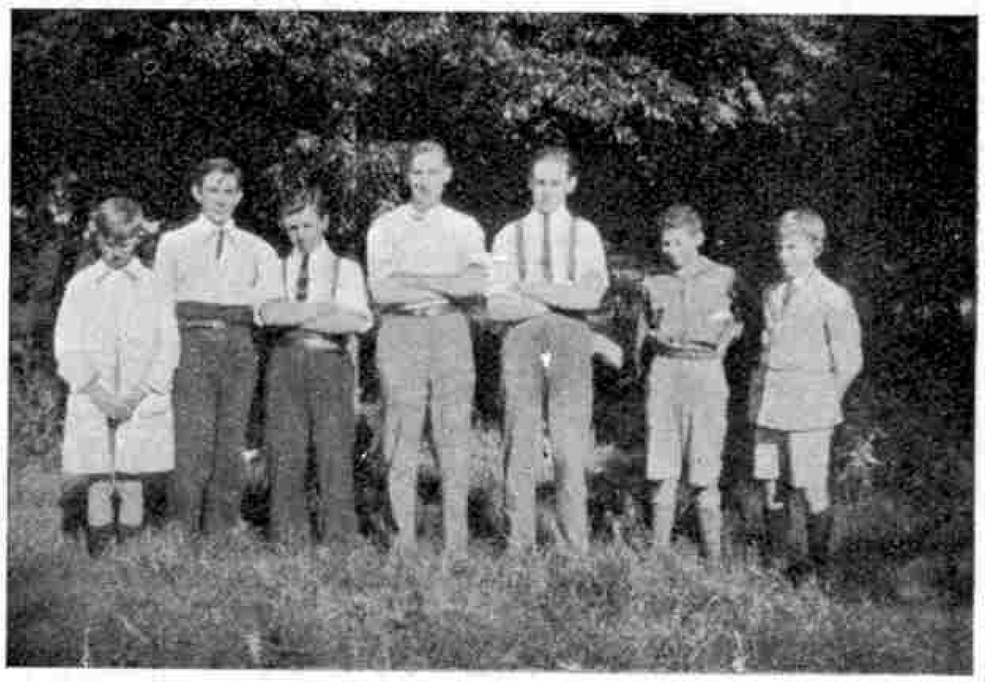
As I have mentioned on several occasions, it is the President's desire to make this a record year in the history of the Guild. A similar wish has been expressed every year since the institution of the Guild in 1919, and up to the present it has always been fulfilled. For the last six years the number of Guild members has grown steadily day by day, until now there are nearly 40,000 Meccano boys all over the world who are wearing the Guild badge. Unfortunately, there are many more boys who have never even heard of Meccano or the Guild, and it is they who must be found and interested if 1924 is to be another record year.

Six Years' Progress

An Argentine Meccano Club

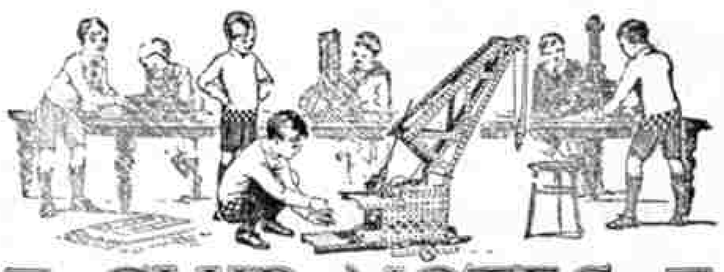
IN whatever part of the world a Meccano boy may be, he invariably manages to find other Meccano enthusiasts, and the formation of a club is usually the result. This has certainly been the experience of Master Charles Edwards, of South America, who is a keen model-builder and a member of the Guild.

Meeting five other boys interested in the Meccano hobby, he soon organised the St. Alban's Meccano Club—certainly the smallest club ever started—and was appointed the first Secretary.



The club has its home at Venado Tuerto, in the Argentine, and two months after its foundation the membership had been increased to eleven. It has now been established well over a year and continues to make good progress. Unfortunately, Master Edwards was compelled to resign his post in November of last year owing to a change of residence, but he still continues to take an active interest in his old club.

The photograph on this page was taken at a recent picnic held by the club, and shows Master Edwards on the extreme right of the group. The Leader, Mr. H. A. Poole, is the centre figure, on his right is the Club Treasurer, Master S. Davies, while the new Secretary, Master Dennis McCarthy, is standing on the left. All Guild members will doubtless wish this club a long and prosperous life, and we trust that the success of the first South American club will encourage other Guild members abroad to "go and do likewise!"



CLUB NOTES

Claygate Juvenile Club (Meccano Section).—The new session commenced on September 6th and the programme includes Model Engineering, Carpentry, Upholstery, Needlework and Knitting. The club is making splendid progress and is now in a sound financial position. The cost of building the club-room has been entirely defrayed, while there is also a substantial bank balance in hand. Cloth badges incorporating the club's initials are issued to all members, and these have proved a very great attraction. A Supper was given on 17th September by the Club Committee to the President, Vice-Presidents, Committee, helpers and other friends who assisted at the recent Club Sports which proved so successful. About 50 people were present and a very enjoyable evening was spent. Club roll: 32 girls, 30 boys. *Leader:* Mr. J. W. Haynes, "Fontmell," Covers Road, Claygate.

West View (Nottingham) M.C.—Club members recently visited the Electricity and Gas Works, Pits and several Water and Engineering Works, and an enjoyable afternoon's camp was held in some local woods in August. Club activities for the present session include Lectures, Model Building, Competitions, various Hobbies, Debates and Games, and the club Library is again being well patronised. Members have also been making experiments with a field telephone which requires neither battery nor wires and, if the tests are successful, further particulars will be given in the "*M.M.*" Club roll: 30. *Leader:* Mr. H. W. R. Cousens. 494. Mansfield Road, Sherwood, Nottingham.

St. Mary's (Newington Butts) M.C.—A very successful Summer Session concluded in July with the club's annual outing to Keston, where an enjoyable day was spent. Other interesting events during the session were visits to the Tower, London Docks, Science Museum and the City of London Electric Light Works. During the present session the club will again take a prominent part in Guild activities in London. The opening meeting was held at the beginning of last month, and an interesting programme was drawn up. This includes Lantern Lectures, Competitions and Model Building, and it was also decided to hold a Grand Exhibition on 15th November. Several applications for membership have already been received and the club intend to make every effort to maintain their position as the largest Meccano Club in the world. Club roll: 103. *Secretary:* Mr. C. Curle, 37, Pullen's Buildings, Peacock Street, S.E.11.

Australia

Adelaide M.C.—Club meetings are divided into three parts. First of all business matters are discussed, then models are built and explained, and finally a competition is held. Models built during the past session include a Meccano Electric Loco (which successfully pulled Hornby rolling-stock round a long track); a Telegraph System made from the Meccano Electrical Set, by which messages in Morse code were sent and received; a Meccanograph and a Meccano Changing Colour Disc. It is also worth recording that butter has been made in the Meccano Churn. At one meeting members were called upon to make 10-minute speeches on various chosen subjects, some of the more interesting being "Do you approve of smoking?" "The greatest man of the 18th and 19th centuries," and "What could we most easily do without?" The club motto is *Labor omnia vincit*—("Work conquers all.") Club roll: 16. *Secretary*: Master R. E. Cornish, 100, Walkerville Terrace, Walkerville, Adelaide, South Australia.

Glenelg M.C.—Though only a year old, this club now boasts an active membership of 62, and is divided into three sections, Junior, Senior and Stamp Collectors. Each Section is in charge of a Sub-leader who lectures on subjects set by the Leader. Meetings are held every Monday evening in the local Scouts' Hall, where debates and model-building competitions are regularly arranged. Club roll: 62. *Secretary*: Master R. Squire, 41, Osmond Road, St. Leonards, Glenelg, S. Australia.

India

Calcutta M.C.—The programme for the Summer Session includes model building, carpentry, papers by members and outings to places of interest. A Concert and Exhibition will be held shortly, when the club will co-operate with local Meccano dealers. A model workshop and club library are well patronised by the members, the majority of whom are keen Boy Scouts. Club roll: 20. *Secretary*: Master A. N. Roy Chowdhry, 35-2, Beadon Street, Calcutta, India.

South Africa

Wynberg M.C.—At a recent club meeting the third quarterly report was read and discussed, after which Messrs. M. A. and L. G. Sylvester were elected Vice-Presidents. A visit paid to a local power station near the docks proved very interesting and enjoyable. Unfortunately the club recently lost its President, Mr. Duveen, for a few months, while Mr. A. J. Lewis, the late Secretary, has already left South Africa and is now in England. A new Club Secretary has recently been appointed, and we wish him every success in his new duties. Club roll: 79. *Secretary*: Mr. E. A. F. Hall, Boundary Road, Rondebosch, C.P., South Africa.

Durban M.C.—Started only a few months ago, this club was affiliated with the Guild in April. A recent meeting for the discussion of plans, enrolment of members, etc., was presided over by the Mayor of Durban, who is the Club's President. Meetings are being held once a fortnight in a local hall, and there is every indication of this club taking a prominent place in South African Guild records. Club roll: 30. *Leader*: Mr. G. E. Patterson, 360a, Berea Road, Durban.

Proposed Clubs

North Shields M.C.—Efforts are being made to form a Meccano Club in this town, and with the loyal co-operation of Guild members living in North Shields, a club should prove very successful. Any Meccano boy interested should write for full particulars to Master Wilfred G. Coates, 17, Lovaine Place, North Shields.

London Clubs' Rally

A Meccano Guild Rally of all the clubs in London and Greater London is being held on Saturday, 1st November, 1924. A varied programme of interest to all Meccano boys has been arranged. Either the Guild Secretary or his representative will attend, and it is hoped that every London club will be fully represented. It should be understood that the Rally is not confined to club members only, and all Guild members in London are cordially invited to attend. The Guild Rally is being held in the club-room of the Holy Trinity Meccano and Radio Club at the Parish Hall, Richmond Road, near the Angel, Islington, London. The meeting starts at 7.0 p.m. and the hall may be easily reached by several 'bus routes, trams from King's Cross or by the Underground Railway.

Sixth Annual Exhibition

As announced in our September number a Sixth Annual Exhibition has been arranged by the Holy Trinity Meccano and Radio Club. Several London clubs are co-operating in this exhibition, and a splendid display of working Meccano models is assured. The chief attraction, which should appeal to all railway enthusiasts, will be a miniature railway system complete with electric and clockwork locomotives and the latest additions to the Hornby Train System.

Further particulars may be obtained from Mr. Stuart Wilson, of 29, Thornhill Road, Barnsbury, London, N.1.

How to Run a Meccano Club

by the

Guild Secretary

(Continued)

There can be no question as to the good effect of competitions in which members can take part under well-regulated conditions. Competitions stimulate and maintain interest, and cultivate that desire to excel that is so valuable an asset when boys launch forth into the world of business. In the syllabus of every club, therefore, certain nights should be devoted to competitions either in Meccano or any other subject.

The arranging and carrying out of such nights will be found to be a great stimulus to the club in general. The competitions in Meccano subjects may include speedy and accurate building of specified models in the Meccano Manuals; improvements in the design of some particular model; clever adaptation of new Meccano parts, or accurate and intelligent description of the construction and use of a selected Meccano model, etc.

The work of invention may also be carried out collectively by a small group of boys as well as by individuals. In the case of a group the members should decide beforehand upon the new model or movement that will form the subject of their attempt, so that their plans will be fully laid before the actual work of building commences at the club meeting. In both individual and collective inventing more than one meeting may be necessary in order to complete the model ready for adjudication.

The Guild Headquarters watch with special interest the inventive efforts of Meccano boys, and I am always particularly pleased to receive photographs or drawings of new models or practical suggestions for new movements.

Special Meccano Evenings

Apart from these competitions, however, the illustrating of mechanical principles with Meccano should provide many interesting evenings. For instance, the Leader might suggest on one particular evening that the members should illustrate a general engineering principle such as "Transfer a horizontal motion into a vertical motion, increasing the speed." As there are several methods of doing this, it will be interesting to note the different ideas put forwrad.

On another evening a talk might be given on some such subjects as "The Inclined Plane," or "Pulleys." At another meeting the Leader might exhibit photographs of some engineering structure—a giant crane, for instance—and suggest that the members should construct a model as nearly as possible resembling the original. If the effort is carried out by the whole club and a combined model is built, each member may himself build some particular part, so that when all are fitted together the model is complete.

Interesting evenings also may be spent in studying some of the special Meccano models—the Chassis or Meccanograph, for instance—and for such occasions arrangements can be made with Guild Headquarters to have some model built and sent on loan to clubs. The following interesting models may be obtained for this purpose:

(1) Transporter Bridge, without motor.
(2) Workshop, working by electric motor.
(3) Chassis.
(4) Concrete Breaking Machine, small model working by clockwork motor.
(5) Girder Suspension Bridge.
(6) Derricking Crane, working by electric motor. This is a particularly good model for demonstrating the principle of the crane.

Three weeks' notice should always be given in order to allow sufficient time for the required model to be assembled. The only expense to the club is the return postage on the model.

Visits to Local Works

The Leader should also endeavour from time to time to make arrangements for members to inspect local engineering works and factories. In a seaport town, for instance, the docks may be visited, and perhaps some large steamer inspected.

(To be continued

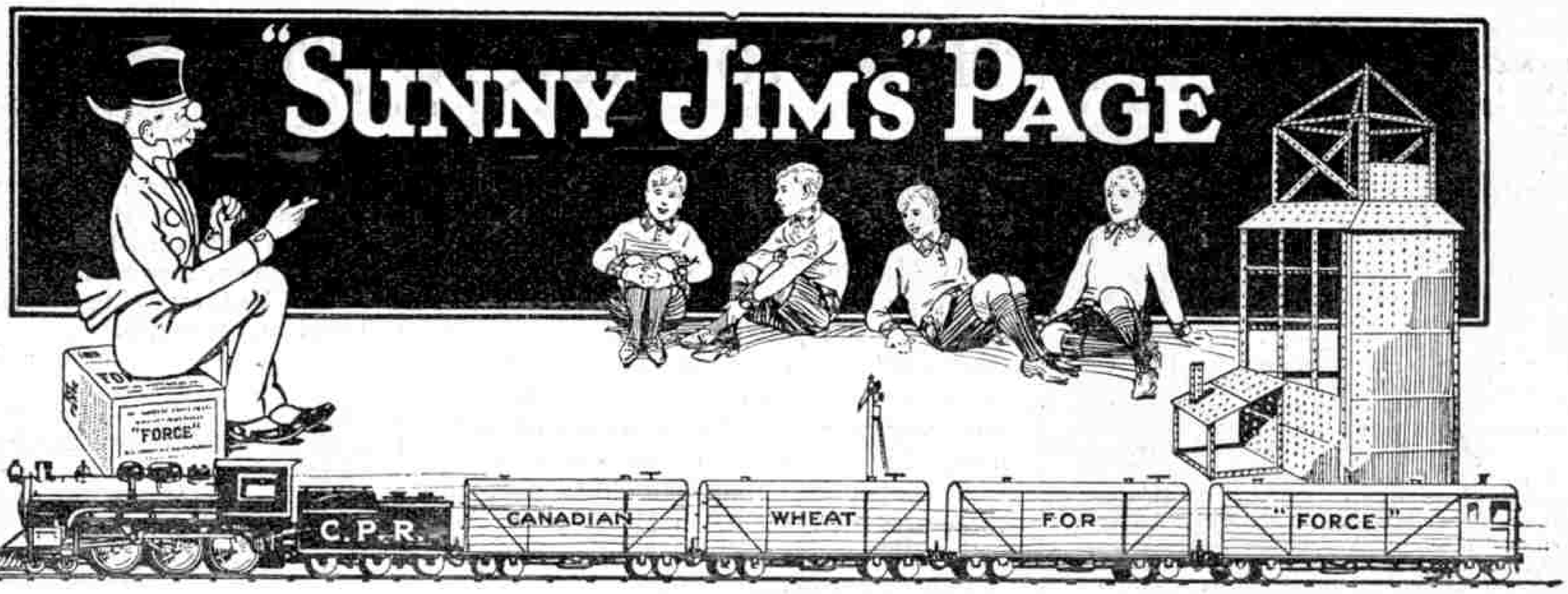
Meccano Club Secretaries

No. 1. Master W. J. ROBERTSON



As Secretary of King Edward's Meccano Club, of Birmingham, Master Robertson has contributed a great deal towards the present flourishing condition of this club. Succeeding Master A. Tims, the first Secretary and Founder of the club, Master Robertson became Secretary in October 1923, and enthusiastically devoted his spare time to organising club activities. He is a keen cyclist, model-builder, and stamp-collector, and was recently awarded a Special Merit Medallion in recognition of his good club work. In recommending Master Robertson for the award, the Club Leader, Mr. Ian McMaster, described him as being "tireless in his zeal and organising work."

All Guild members will join us in congratulating the King Edward's Meccano Club on the possession of so energetic and capable a Secretary, and wish them every success in the coming session.



HOW "FORCE" IS MADE
A WONDERFUL PROCESS

The story of "FORCE" starts on the horizon-wide wheatlands of Canada, long before Summer brings the droning reaping machine. It starts with the ploughing of the land and the sowing of the seed. Wheat is the finest cereal ever known to mankind. In this one cereal we have all the protein, starch, minerals and salts needed to keep the body in good health. We have more than this—we have these valuable foods present in the correct proportions for complete nourishment.

When Summer comes to the wheatlands the grain is tall and ready to ripen to that rich golden colour familiar to all of us who have visited the English countryside at harvest time.

After the reaper and binder has done its work the shocks of corn are carried for threshing, the grain is loaded into wagons for transportation to the tall grain elevators at the railside, and from these it is transferred into the big covered freight cars of the Canadian Pacific Railway.



Now let us go to the "FORCE" Mills at Ayr in Ontario and see the journey of the wheat from its arrival there to the time when it leaves for England, transformed into flavoury flakes of "FORCE."

First the new grain is cleaned and re-cleaned until every particle is perfect. The cleansed whole wheat is then passed into great steam cookers where it is cooked with barley malt. It is the clever addition of barley malt at this stage that gives to "FORCE" its wonderful flavour and assists in making it so wholly digestible.

When cooked, the wheat is rolled out into flakes which are then toasted to a rich crisp brown. While still warm, and still untouched by hand, the flakes are boxed by machinery and then packed for shipment. Next time you go to the grocer's look around you. You will soon spot the familiar yellow "FORCE" packet with "Sunny Jim" on the front of it. That is the packet you must ask mother to let you buy, because it contains the very same wonderful flavoury nourishing food about which we have just been talking. Mother will let you have "FORCE" if you ask her because it needs only the addition of hot milk to make a delightful dish for beakfast or supper. You will want to eat "FORCE" because, first and foremost, it is *good* to eat, nice to eat, delicious to eat. Secondly you need "FORCE" because it is ideal for keeping up a high standard of health and strength. A box of "FORCE" has 1,260 units of energy in it. An equal weight of eggs has only 474. Steak, which we all know is good food, can only show 768 units, while an equal weight of codfish comes right down on the list with a mere 240 units.

So, boys, for health and strength, *and for a jolly fine food, too*, EAT "FORCE." Send now for the free sample offered on this page. It will give you a chance to prove to mother what a really fine food you have discovered. Then make sure she gets it for you regularly ! ! !

Yours forcefully,

Sunny Jim

SEND THIS COUPON FOR A FREE SAMPLE
FORCE
WHOLE WHEAT FLAKES
MALTED AND TOASTED
Post to "Sunny Jim," Dept. M.C.2, 197, Gt. Portland St., London, W.1.
If you prefer, send a Postcard.
Name .....
Address .....
.....
WRITE PLAINLY PLEASE



Fireside Fun

THE "Tongue-twister" epidemic appears to have subsided altogether for the time being, and I am going to take advantage of the peaceful interval to draw attention to other equally interesting but less strenuous amusements.

I have had many requests from time to time for puzzles connected in some way with Meccano, and I give below a very interesting one suggested by Master James B. S. Curr, 19, Well Street, Paisley, to whom the monthly prize of 5/- has been awarded. The problem is to fill in the blanks in the following sentences with names of Meccano Parts. In one or two instances, where the name of a part consists of more than one word, only one of these words has been used, but in each case sufficient is given to enable the particular part to be identified:—

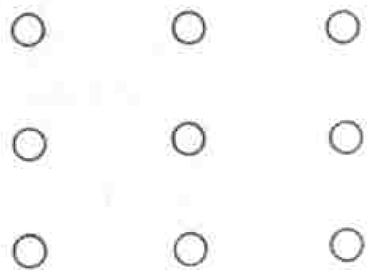
Puzzle No. 34

Dick was only a —— of a lad, and he thought his —— was an —— old ——. Dick's wage scarcely enabled him to buy sufficient ——, let alone his favourite ——. Even a —— will turn, however, and presently Dick became convinced that he could —— out of the old —— an increase in wage. Without any beating about the ——, he —— his —— and —— himself for the attempt. He took no chances, however. There was some risk that his employer would —— and —— him, and therefore Dick held himself ready to —— round on his ——, —— through the door and —— for his life.

* * * *

Puzzle No. 35

Can you join these nine rings by four straight lines?



(*Contributed by Ronald Storey, Scarborough*).

* * * *

Dick: "Father, what does transatlantic mean?"

Father: "It means to cross the Atlantic."

Dick: "Does 'trans' always mean to cross?"

Father (very sharply): "Yes."

Dick: "Then I suppose transparent means a cross parent!"

This Month's Short Story

Waiting Will
Caught a chill,
Took wrong pill,
Now he's still.

* * * *

Q. Why does a duck go into the water?
A. For divers reasons!
Q. Why does he come out?
A. For sun-dry reasons!
Q. Why does he go in again?
A. To liquidate his bill!
Q. And come out again?
A. To take a run on the bank.

* * * *

Puzzle No. 36

A grocer who was called upon to weigh 1 lb. of tea for a customer in a hurry found that his weights had been mislaid. It was essential that this particular customer should be served, however, and suddenly the grocer had an inspiration. He knew that the left-hand side of his scale held a pint or more of water, also he had a metal paper-weight that weighed six-and-a-half ounces, and a vessel that held exactly half-a-pint of distilled water. He sat and thought for a minute or two, and then contrived a method of weighing exactly 1 lb. of tea. How did he do it?

THE LIMIT!

After a particularly trying day an editor went home with his nerves on edge and at once sought refuge in his study, well away from the noises of the household. He sat down by the fire and was gradually feeling calmer, when the cat, which had been sitting there too, got up slowly and walked across the room.

The editor started, then turned on her and said indignantly:

"Now, what are *you* stamping round here for?"

* * * *

Teacher: "Now, Dick, how many ribs have you?"

Dick: "I don't know, mum, I'm so ticklish I can never count 'em?"



PAPER EVERYTHING

The wife of one of the new rich was having her palatial mansion re-decorated. Painters and paper-hangers swarmed like ants, and slapped on gilt paint by the bucketful.

One morning the foreman approached the mistress of the house. "I've just finished the morning-room," he said. "What next?"

"You can do the study on Friday," said the lady.

"What shall we do in the interim?"

"Oh, paper that, too!"

Answers to Last Month's Puzzles

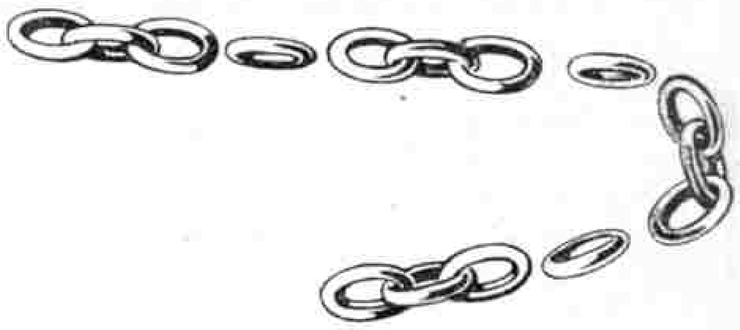
No. 31. Missing names of flowers:—
1. Pink. 2. Iris. 3. Anemone. 4. Daisy. 5. Pansy. 6. Lobelia. 7. Harebell. 8. Rose. 9. Gentian.

* * * *

No. 32. 3/9.

* * * *

No. 33.



The jeweller took one piece, broke the three links, and welded the other four pieces together with them.

EGGS TRORDINARY!

"Do you say that your hens 'sit' or 'set?'" asked the precise schoolmaster of the busy housewife.

"It never matters to me what I say," was the quick reply. "What concerns me is to learn, when I hear the hen cackling, whether she is laying or lying."

NOT THAT MAN.

Roy Simpson, negro labourer, was putting in his first day with a gang whose foreman was known for getting the maximum amount of labour out of his men. Simpson was set on to carry heavy timbers and ties until at the close of the day he was completely tired out. Before he knocked-off he approached the foreman and said:

"Mister, you sure you got me down on the pay-roll?"

The foreman looked over the list of names he held. "Yes," he said finally, "here you are—Simpson—Roy Simpson. That's right, isn't it?"

"Yaas, boss," said the negro, "dat's right. I thought mebbe you had me down as Samson."

"IT'S NEVER TOO LATE . . . ."

A man went to a judge and asked whether he could bring suit for slander against a man who had called him a rhinoceros.

"Why, certainly," said the judge. "When did he call you that?"

"About three years ago."

"Three years ago! And you only start your action to-day?"

"But, your honour, it was only yesterday that I saw a rhinoceros for the first time."

* * * *

Q. Why are potatoes like gate posts?
A. Because they both propagate.

400

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that you can work at home

"The Amateur Mechanic"

will teach you the working principle of any hobby or trade you wish to learn. It is the most wonderful book of practical handicrafts that has ever been published. Over 50 experts were engaged in writing it, and all these men give you the very best of their long practical experience. Everything is so clearly explained and so fully illustrated that you simply cannot go wrong.

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To make your own wireless set—How to make garden frames, garden furniture, and garden paths—How to mend windows, and to make, mend and strengthen locks and bolts—To clean, overhaul and repair motors and motor cycles—To instal electric light, etc.—To etch on brass—To build a boat or canoe—To paint and paper a room—To sole and heel and patch boots and shoes—To make a pair of hand-sewn boots—To make household furniture—To re-seat chairs—To upholster sofas, etc.—To instal a speaking tube—To clean a stove—To repair bicycles—To work in metal—To repair water taps—To varnish a violin—To repair the piano—To make a padded chair from an old cask—To stuff furs—To stuff and mount birds—Wood-inlaying—To prepare working drawings—To renovate a grandfather's clock—To make garden arbours, arches, seats, summer-houses, etc.—To use metal-drilling tools—To renovate mirrors—To mend china—To do fretwork—To lime-white poultry-houses—To do gold and silver-plating—To clean a watch—To mend keyless and ordinary watches—To distemper ceilings and walls—To make picture frames—Curtain fitting—Make and fix roller blinds—Lay carpets—Repair a wire mattress—Re-tyre and renovate a perambulator—Make or repair a camera—Repair and renovate sewing machines—Make or repair a gramophone—Instal electric bells—How to cure damp walls, leaky roofs, etc., etc.

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Price each **30/-**

FROM ALL MECCANO DEALERS

Competition Corner

THIRD COMPETITION

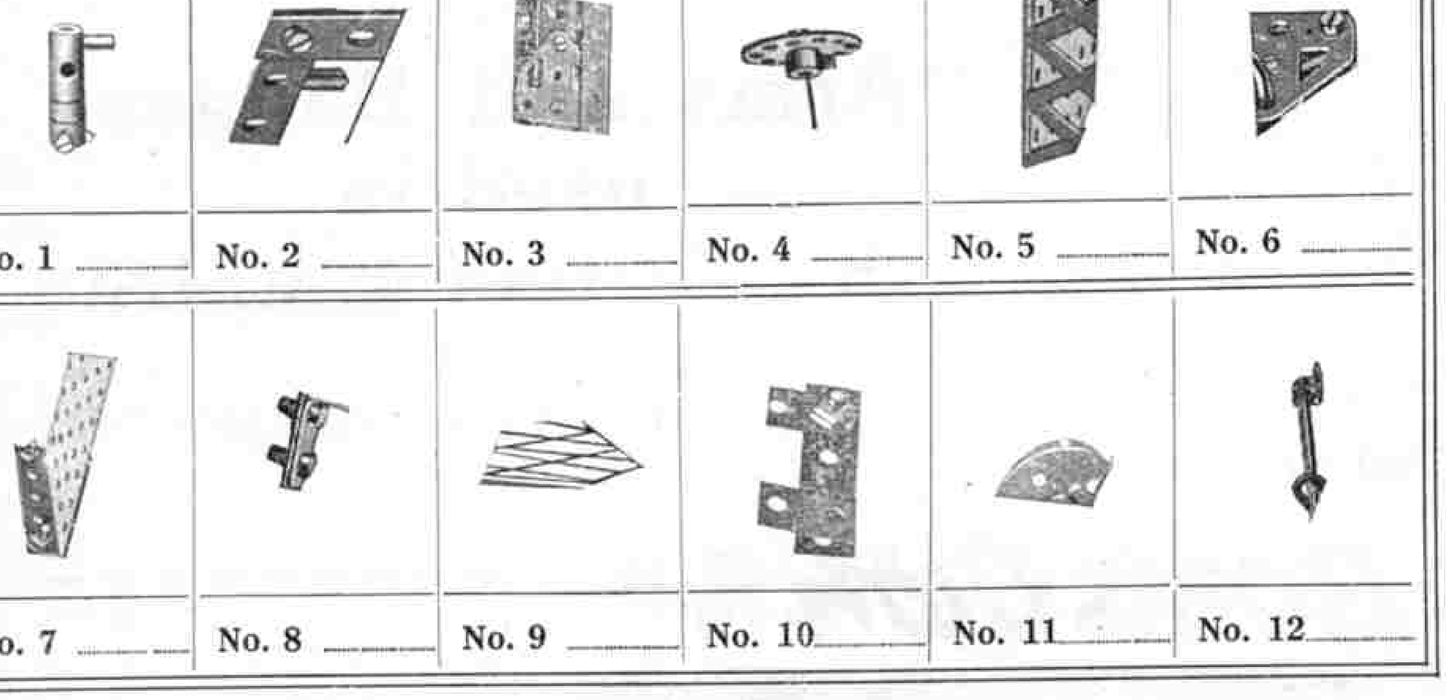
For Lynx-Eyed Readers

FIRST PRIZE : Hornby No. 2 Pullman Set. SECOND PRIZE : Meccano No. 1 Radio Receiver

THIRD PRIZE : Pair Meccano Headphones.

CONSOLATION PRIZES : 12 Meccano Writing Pads ;
12 Meccano New Complete Manuals (1924).

FIRST SET



No. 1 ..... No. 2 ..... No. 3 ..... No. 4 ..... No. 5 ..... No. 6 .....

No. 7 ..... No. 8 ..... No. 9 ..... No. 10 ..... No. 11 ..... No. 12 .....

INSTRUCTIONS FOR COMPETITORS :

Very varied have been the competitions announced in the "*M.M.*" from time to time, but none have proved so extraordinarily popular as the last two for "Lynx-Eyed Readers." Altogether several thousands of entries were received, and since the closing date of the last set we have had numerous and insistent requests from readers asking for more Puzzle Pictures. One enthusiastic Meccano boy writes that owing to his close study of the manual in connection with these contests he now knows far more about the models, how they are built and the uses of the various parts than he knew before. There is no doubt that these competitions do help to make the construction of models clear, while they also act as a splendid test of a boy's powers of observation. We are therefore announcing a third competition in this series, and we hope that every reader of the "*M.M.*" will try his best to win one of the twenty-seven splendid prizes offered.

The pictures illustrated above have all been taken from models illustrated in the 0-3 Manual (either edition No. 23 or 24) and competitors are advised to work from these recent manuals.

As in the two previous contests, there will be three sets of pictures in all, and the last set will be published in the Christmas "*M.M.*" Competitors must attempt to solve all three sets to qualify for a prize. *No entries are to be sent in until the last set has appeared.*

The First Prize will be awarded to the competitor who sends in an entry containing the correct numbers of all the models from which the pictures were taken. In the event of two or more competitors sending in correct entries neatness of writing will be considered and the prizes awarded in order of merit. If no competitor succeeds in correctly numbering all the pictures the prize-winners will be those whose entries are most nearly correct.

NOTE.—It should be clearly understood that competitors will not be required to tear out the pages containing the Puzzle Pictures. The dotted lines are provided for the competitors' convenience only. All entries must be sent in on post-cards.

Tenth Photo Competition

A Beach or Riverside Scene

By the time this number of the "*M.M.*" appears, most of our readers will have returned from their holidays, and those who took cameras with them will be looking through their prints and recalling various happy hours at the seaside or in the country. Holiday photographs have a special interest of their own, and therefore we have decided to announce another photographic contest—the Tenth—the subject of which is :—"A Beach or Riverside Holiday Scene."

Following our usual custom, this competition will be divided into Section A for those under 16 years of age, and Section B for those of 16 years and over.

Prints may be mounted or unmounted and may be made by any process, daylight or gaslight. An important condition of the competition is that every entrant must write his name, address and age on the back of each print submitted, and must also state by whom the photograph was developed and printed. In the event of a tie for a prize, photographs which have been developed and printed by the competitor will naturally receive preference.

Four prizes will be offered in this contest—Meccano No. 1 Radio Receivers as first prizes and Meccano goods to the value of 5/- as second prizes in each section.

The closing date for readers in the United Kingdom is 31st October, and for Overseas readers 31st January, 1925. Entries should be marked "*Photo Contest*" in the top left-hand corner of the envelope.

Result of "Bargain Hunt" Competition

This novel competition, "bargain-spotting"—the first of its kind to be announced in the "*M.M.*"—has proved an unqualified success. The majority of the stamp collectors among our readers took full advantage of the opportunity to test their knowledge of stamp values, and "bargain-hunting" post-cards arrived in large numbers every day up to the closing date. The voting was very close, and though a large number of competitors agreed on the first two items, the third seemed to cause considerably more difficulty in its selection.

All votes have been carefully counted, with the following results :—(1) Hillier, of Horsmonden ; (2) Norris & Co., of Alfreton ; (3) Witherick of Coventry, and Lisburn and Townsend of Liverpool, a tie. The only entry bearing these names in their correct order was sent in by R. Heath, of Sheepscombe, Stroud, who has therefore been awarded the first prize. His choice of a 10/6 packet of stamps has been forwarded to him, and we congratulate him on his successful judgment.

As no other competitors sent in correct entries, the other three prizes offered have been awarded to those whose post-cards corresponded most closely with the general order of voting. J. Ormston, of Blaydon-on-Tyne, D. W. Bryant, of Highgate, London, and George E. Scragg, of Stockport, are therefore entitled to free advertisements in the "*M.M.*" in which to announce their own bargains or wants.

The additional prize offered to the dealer in whose advertisement the biggest stamp bargain was found was awarded to Mr. Hillier, of Horsmonden, who is a regular advertiser in our pages.

We hope to announce another competition of this character in the near future, in which other readers as well as stamp collectors can take part.

FOR

OVERSEAS READERS

Result of "Favourite Model" Competition

Curiously enough, the results of this Section of the Essay Contest on "My Favourite Model and Why I Like it" were something similar to those in the Home Section. In the latter section the Chassis was by far away the most popular model in the Manual of Instructions, and in the Overseas Section the Limousine headed the list by a large majority. The entries received were not quite so numerous as usual, but they were generally of a very high standard and exceptionally neatly written.

This Overseas Section was sub-divided into two further sections—(A) For those of 12 and under, and (B) for those over 12 years—and Hawk-Eye cameras were offered as prizes in each section. The winner of Section A was Leonard Fisher, aged 12, who sent in a well-considered and well-written essay on the pleasures to be derived from constructing the Meccano Limousine. (If Master Fisher will let us know his address his camera will be sent to him). Senji Sammie, of Madras, was awarded the prize in Section B for his bright and clever essay on the merits of the Meccano Loom, and a Hawk-Eye camera has been despatched to him.

IMPORTANT

We are constantly asked to supply back numbers of the "*M.M.*" We print only sufficient copies to fill our regular orders, and as a rule back numbers cannot be supplied. In order to prevent disappointment our readers are advised to place a regular order with a Meccano dealer, a newsagent, or direct with us.
(Subscription rates on page 320).

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"The Fortunes of Humphrey Dawn"

A Story of Roundhead Days.

By G. GODFRAY SELLICK. *Illustrated by Gordon Browne, R.I.*

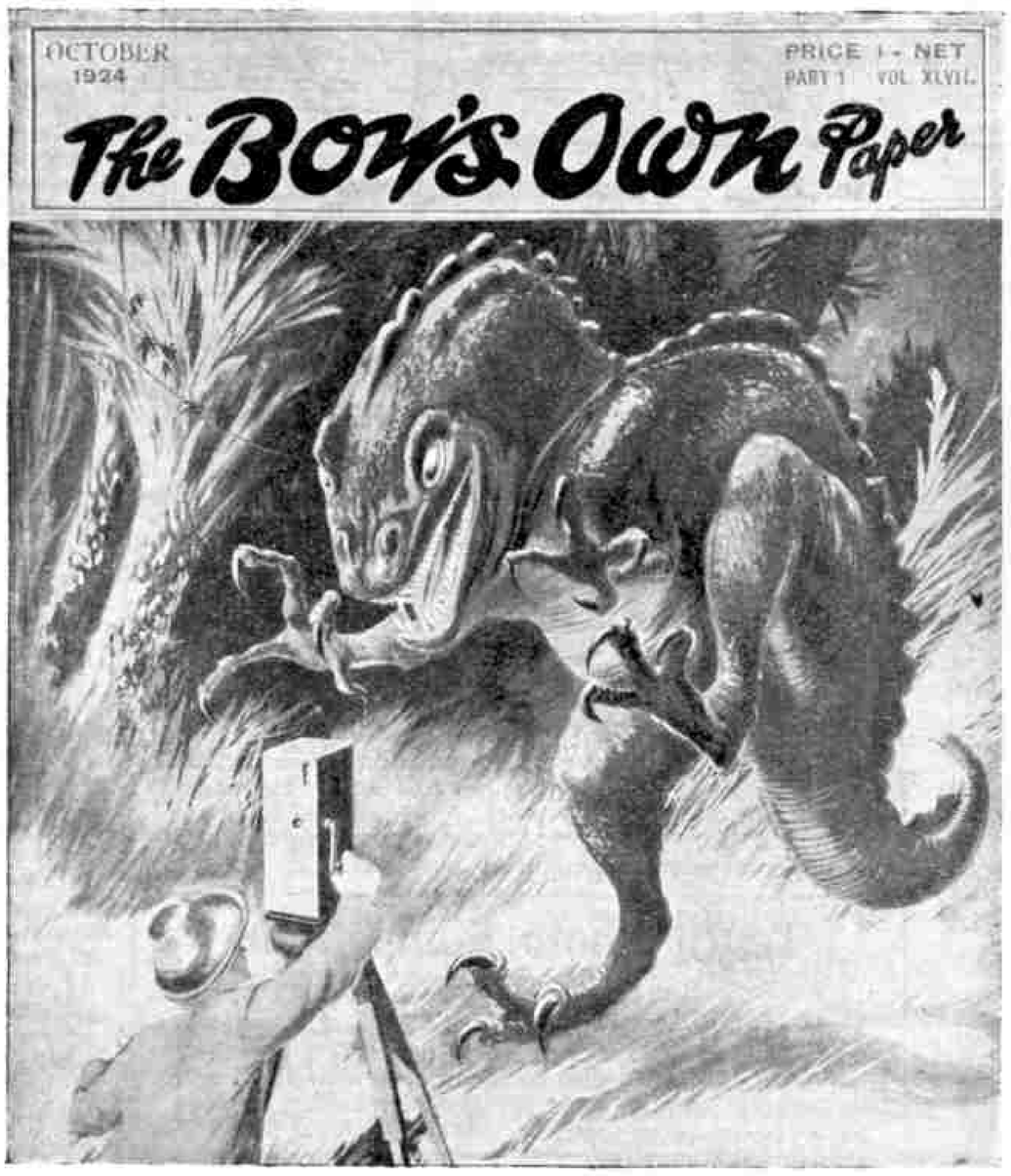
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Complete range of Models

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Enamelling a Bicycle

by "ROVER"

NOW that the season of rainy days and muddy roads is again approaching, cyclists will do well to overhaul their machines and make them weatherproof so that they will be in readiness for the winter months. Perhaps the plated parts have been allowed to become slightly rusty, and if so all rust should be removed and the parts well polished. The working parts should be well oiled and all bright parts rubbed over with a greasy rag or lightly smeared with vaseline or petroleum jelly. Although such a covering naturally causes the surface to retain dust and mud, it is a simple matter to remove the grease when required, thus revealing the clean and bright plating beneath.

Doubtless the enamel on the frame will have chipped off in several places. If it is intended to use the cycle during the winter instead of storing it away as some people do, it will be found well worth while to re-enamel it at home, and when this has been done you will have a smart-looking machine, well prepared to withstand the bad weather of the winter months.

What You Must Have

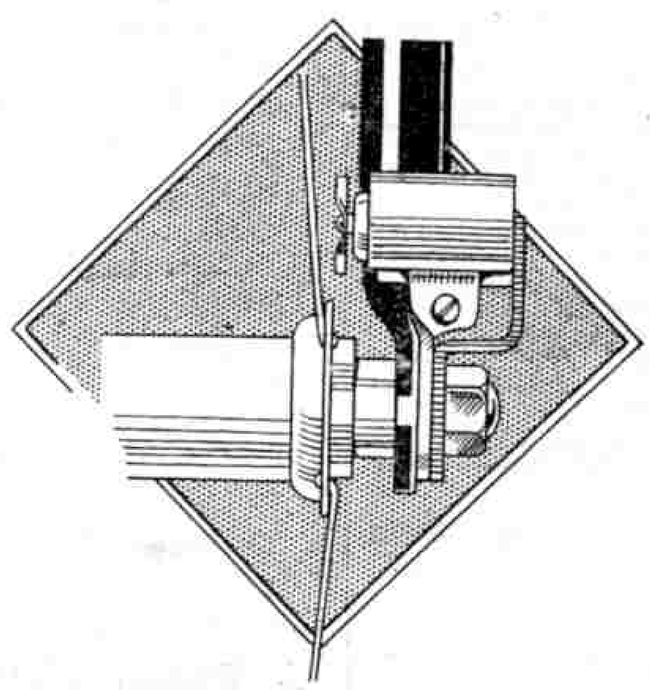
Enamelling a cycle is not a difficult matter, and all the necessaries may be obtained for three or four shillings. You must have a tin of some good brand of black enamel, a medium-sized brush with soft hairs, a piece of emery paper, some pumice-powder and an old three-cornered file.

The work should be carried out in a fairly warm room, which should be as clean as possible and free from dust. All accessories, such as pump, bell, saddle, lamp, etc., should be removed from the cycle and the wheels should be taken out, so that only the frame remains. All bearings should then be cleaned out with paraffin and well oiled, surplus oil being removed from the frame with a clean rag. The frame should be suspended in a convenient position and the old enamel removed by lightly rubbing with the file, the surface being made smooth with the emery cloth. Then wipe over the frame with a clean damp cloth and the cycle should be ready for the first coat of enamel.

Enamelling the Wheels

The wheels are treated in a similar manner to the frame, the tyres being removed and the rims and spokes scraped and rubbed with emery to remove the old enamel. If the rims are plated it may be decided to enamel them completely, as more often than not the plating is rusty in places, owing to the rim-brakes having worn it away. Even if the plating is in good condition it is a difficult job to successfully enamel only a portion of a rim and to leave the original plating. You could attempt the job, however, and if you are not successful you will always be able to go over the whole rim again with the enamel.

FIXING A CYCLOMETER



Cyclometers are usually fitted on the left-hand side of the front wheel spindle, as illustrated above. A striker (not shown) secured to a spoke engages the "star" wheel projecting from the cyclometer, and operates the mechanism with every revolution of the wheel.

Three Coats of Enamel Required

While the first coat is drying every precaution should be taken to prevent any dust from settling on the wet enamel. When quite dry, the frame should be rubbed over with a cloth and pumice-powder and water, or with a piece of worn emery paper. The frame should then be washed thoroughly in clean water, and after it has dried the second coat may be applied. When it has dried it is treated in the same way as the first coat, pumiced, washed, and dried as before.

(Continued on page 313)

Ride a Bicycle

But be sure it's a good one

Agents for:—

Raleigh All-Steel—Prices from £8-0-0

Humber—Prices from £7-7-0

Easy Terms arranged

Good Stocks are held of Meccano in all its branches. Model Railway Enthusiasts are invited to visit our Demonstration Track. Each Model Loco tested before despatch

Arundel Cycle & Sports Stores

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Stamps for Sale

(*See also page* 298)

COLONIAL AND FOREIGN, including mint, war and high value Colonials. Pick any 50 for 2/–. Many good stamps.—Miss M. Saunders, 78, Church Lane, London, S.E.7.

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Entrance Fee 1/–. Yearly Subscription 1/–. Opportunities—everything. Liabilities—none. Enquiries welcomed from all serious collectors above 17 years. Secretary: Stanley H. Cockrill, J.P.S., 45, Kitchener Road, Ipswich.

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CANADA, King George, 3 cent, carmine ... 2d.
CAYMAN ISLANDS, Large head, ½d. green, script 1d.
CYPRUS, new issue, ½ pi. grey and chestnut, script 1d.
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MOROCCO AGENCIES, 5c. on ½d. green ... ½d.
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APPROVAL SELECTIONS of cheap stamps, with large discounts, sent on application. State countries in which you are interested.

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FREE. Six Siam to applicants for approvals, mentioning "*M.M.*" 1000 assorted, 9d., post free, abroad 1/–; 500 all different, 2/6, abroad 2/9.

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FREE—6/-

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Condition Fine.

20 Iceland, 1/–; 40 Finland, 9d.; 50 Czecho-Slovakia, 8d.; 50 Georgia and Ukraine, 1/3; 50 Russia, 9d.; 50 Roumania, 9d.; 50 Latvia and Esthonia, 2/–; 50 Austria (only Feldpost issues), 1/9; 40 Airpost, 1/6; 50 Central Lithuania, 1/6; 100 mint Germany Republic, 9d.; 25 Bosnia, 8d.; 300 Austria, 1/6. **Postage Extra.**

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150 German ...	1/–	100 „ „	2/6
200 „ ...	2/–	300 Postage ...	1/–
150 Austria ...	1/–	600 „ ...	5/–
200 „ ...	2/–	500 Revenue	5/–
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Small Advertisements

(*Advertisement Rates on page* 320)

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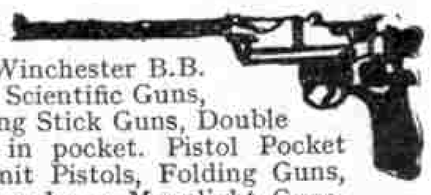
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HOW TO ERECT, CONNECT AND MAKE all kinds of wireless apparatus, including crystal and dual amplification sets, one and two-valve amplifiers, also the latest two, three and four valve tuned anode receivers. 160 pages including diagrams.

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1/3 post free

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The pages of the "*M.M.*" offer you a world-wide market. For a small charge of 10/- per column inch (2¼ inches wide), your advertisement is brought to the notice of thousands of potential customers each month. An advertisement in the "*Meccano Magazine*" will be read by over 100,000 readers in all parts of the world.

Rates and Specimen Pages on request.

Advertisement Manager,

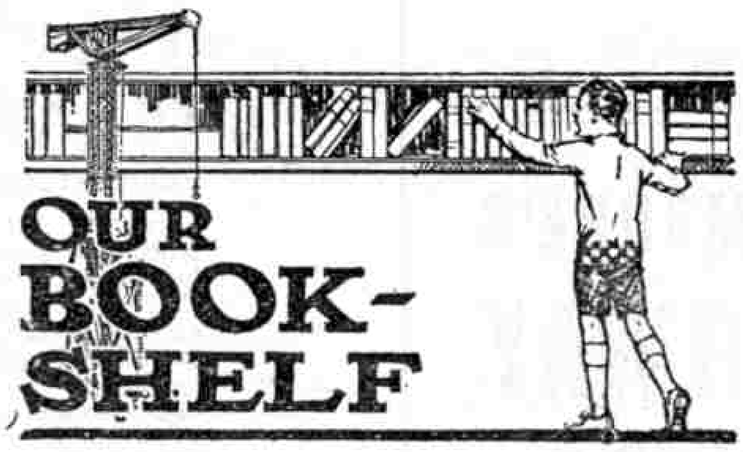
"*Meccano Magazine*"

BINNS ROAD, LIVERPOOL

Air Race Thrills

An exciting new game which claims to give the players all the thrills of aviation without any of the attendant risks, has recently been sent to us by the makers. "Flip-o-Hoy" consists of a strong board, 26" × 17½", on which are drawn an outer circle or aerial course and an inner circle known as the propeller course, on account of the swinging propeller mounted in the centre. Each player has a well-made model aeroplane fitted with revolving wheels and propellers, and the board is designed to represent the view as seen from an aeroplane in flight. Travelling over the aerial course the 'plane experiences various adventures such as stunting, gaining altitude, and engine trouble, while the propeller course is marked out with numbers, signifying awards and incidents that occur in aviation.

"Flip-o-Hoy" (which is made by Mr. H. W. Woods, of Farnborough, Hants.), is an ideal game for winter evenings, and an illustration with further particulars will be found on page 317.



Readers frequently write to me asking if I can recommend books that are both of interest and of use. In this column I review books that I consider specially appeal to Meccano boys. I do not actually supply these books, which may be obtained either through any bookseller or direct from the publishers.

All About Our Wonderful Ships

By Archibald Williams

(*Cassell & Co. Ltd.* 7/6 *net*).

Ships have a great fascination for young and old alike, for there is an element of romance about even the most disreputable tramp steamer. To the landsman every ship is more or less a mystery, and in "*All About Our Wonderful Ships*" the author succeeds in dispelling something of this mystery without destroying any of the romance. He tells us how ships are designed and built and describes the wonderful machinery, hidden away in their interiors, that propels them steadily across the oceans of the world. He takes us on imaginary tours of inspection of vessels of various types, ranging from giant Atlantic liners to fussy little tugs, and he shows us how each is perfectly adapted to its special purpose. Altogether Mr. Williams has succeeded in producing a book that will appeal to all British boys, and more particularly so to those interested in the sea. The book is well illustrated with numerous plates and figures.

"The New Photographer,"

(41, North John St., Liverpool. Price 2d Weekly).

This interesting photographic paper more than maintains its high standard of excellence, and indeed becomes increasingly attractive. It caters specially for the beginner, and those of our readers who feel that the results they are obtaining are not proportionate to the labour and money they are expending would do well to become regular subscribers and so acquire a good photographic education at the small cost of 2d. per week. In addition to clearly-written and well-illustrated articles, there are competitions so graded that every reader has a chance of winning a prize, no matter how small his photographic abilities may be. Of particular interest is a great holiday competition with cash prizes amounting to £165. Full details will be found in the current issue, and a free copy will be sent to any of our readers who applies mentioning the *Meccano Magazine*.

"Wireless World and Radio Review."

(Wireless Press, London. Price 4d. Weekly).

This publication is a radio review in the best sense of the term. The latest issue to hand, No. 265, includes the first of three important contributions by Professor E. Mallett on sound in relation to wireless. Users of frame aerials will read with keen interest a description of a receiver specially designed for use with such aerials. Another article describes the wireless equipment of aeroplanes of the U.S. Post Office Department.

CATALOGUES RECEIVED

The 1925 catalogue recently issued by Messrs. Hobbies Ltd. (Dereham, Norfolk) is a most interesting production and as a guide to the selection of outfits and materials for fretwork it is unequalled. No less than 640 different designs for fretwork articles are included and over 80 pages are devoted to the tools and materials required for some 20 other pastimes, such as bent iron work, picture-framing, strip-work, wood-carving, etc. The catalogue, which contains more than 200 pages and is beautifully printed and illustrated, will be sent post free for 1/-. With each copy is included free an excellent design for a fretwork bureau.

A New Meccano Model (*cont. from p.* 285)

a Worm (33, Fig. D) which engages a Gear Wheel (34). On the spindle of (34) is a Pinion (35), which engages and drives the 3½" Gear Wheel (11), thus rotating the shovel.

On the 3½" Rod (36) is wound the Cord (37) for raising and lowering the jib (38), and on the 6" Rod (39) is wound the Cord (40) for raising and lowering the shovel (41). The Rod (36) is journalled in a Trunnion bolted underneath the Strip (42) and carries a 1½" Gear Wheel (43), which is engaged by a Pinion (44) on an 8" Rod (45). This is driven by a 1½" Sprocket Wheel (46) from the 1" Sprocket Wheel (26) on the motor spindle (47).

The spindle (45) is slideable by the rotation of an 8" Rod (48) operated by the Crank (49), the Rod being journalled in the ends of a 5½" × ½" Double Angle Strip (50), a Coupling (51) carrying a 1" Rod which engages between two Collars on the Rod (45). In this way the Pinion (44) may be meshed with the Gear Wheel (43) in order to raise or lower the jib, or a 1" Gear Wheel (52) on the Rod (39) may be engaged with a 1" Gear Wheel (53) to raise or lower the shovel arm (38).

The Rod (28) is slideable by a 4½" Strip (54) pivoted at (55), the outer end of which engages between two Cranks (56). These grip on either side of a 1½" Gear Wheel (57), several washers being placed between the Cranks to take up the slack. The shovel (41) is carried on a sliding frame consisting of Angle Girders (58) to which are bolted Racks (59). These are engaged by ½" Pinions (60) on a 3½" Rod. A 50-toothed Gear Wheel (61) is driven by a ¾" Pinion (62) on a 3½" Rod (63) operated by the hand-wheel (64). The bottom of the shovel is released by a Cord (65) connected to a sliding Rod (66), the end of which enters the aperture of a Flat Bracket (67).

Parts required:

2	of	No.	1A	1	of	No.	28
1	"	"	1B	2	"	"	30
6	"	"	2	2	"	"	31
1	"	"	2A	1	"	"	32
4	"	"	3	1	"	"	33A
1	"	"	4	5	"	"	35
5	"	"	5	195	"	"	37
7	"	"	6	24	"	"	38
4	"	"	8	1	"	"	40
6	"	"	8A	1	"	"	45
4	"	"	8B	1	"	"	48
7	"	"	9	3	"	"	48A
2	"	"	9B	1	"	"	48D
4	"	"	9D	5	"	"	52A
4	"	"	9F	36	"	"	59
7	"	"	10	3	"	"	62
6	"	"	11	2	"	"	63
11	"	"	12	4	"	"	72
4	"	"	12B	2	"	"	76
2	"	"	13A	2	"	"	77
8	"	"	14	36"	"	"	94
2	"	"	15	1	"	"	95
1	"	"	15A	1	"	"	95A
7	"	"	16	3	"	"	96
4	"	"	16A	1	"	"	96A
1	"	"	18A	2	"	"	103
5	"	"	18B	2	"	"	103B
8	"	"	20	2	"	"	103F
1	"	"	21	1	"	"	103H
2	"	"	22	2	"	"	103K
4	"	"	22A	4	"	"	110
2	"	"	23	4	"	"	111
4	"	"	23A	2	"	"	115
5	"	"	24	1	"	"	118
1	"	"	25	4	"	"	125
9	"	"	26	3	"	"	126
1	"	"	27	4	"	"	133
7	"	"	27A	1	"	"	143
1	"	"	27B	1	"	"	145

Electric Motor

A Novel Stamp Album

Messrs. Geo. Philip & Son Ltd. (32, Fleet Street, London, E.C.4) are publishing a novel form of Stamp Album (price 7/6), combined with an Atlas that will appeal to many stamp collectors who are interested in Geography. The publishers will send full particulars to any reader on his mentioning the "*M.M.*"



F. MOORE'S RAILWAY PHOTO-GRAPHS

SIX SETS of postcards in colors—of famous locomotives and trains, twelve cards in each set. Price **1/6** each or **8/6** the six sets, post free.

FOUR SETS of photogravure postcards—of trains belonging to the four groups, viz. :—London, Midland and Scottish, London and North Eastern, Great Western, and Southern, twelve cards in each set, price **1/6** each or **5/6** the four sets, post free.

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TWELVE Collotype reproductions of Great Western locomotives. Size 9″ by 6″, mounted in album. Price **2/9**, post free.

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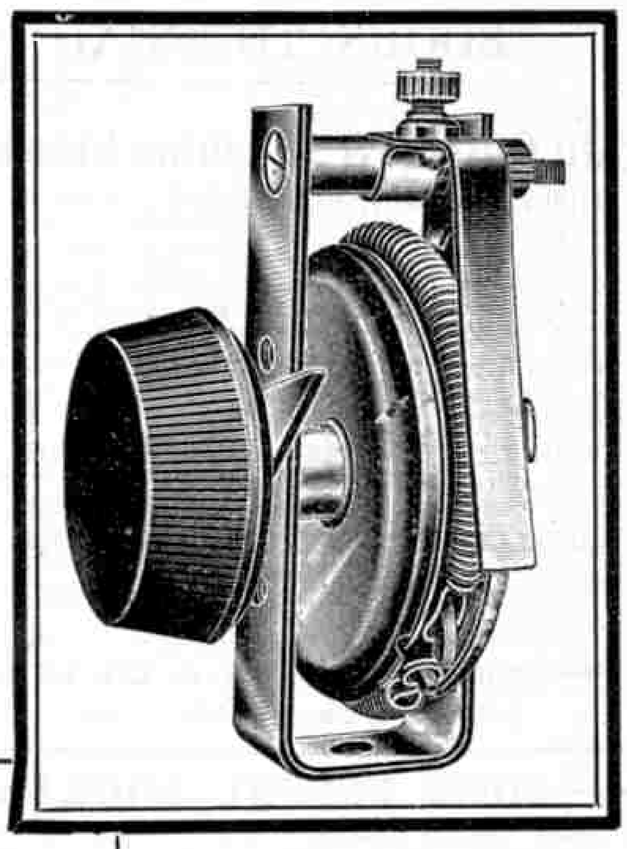
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Ask the fellows who have already built sets with Igranic components. They know the perfect team-work they obtain. For each Igranic Radio part is ideal for its purpose—with one Igranic part you get *better* reception but with all Igranic components used in correct circuit you have all parts working in harmony (like the good soccer eleven) and the result is *perfect* reception.

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BRADFORD : 18, Woodview Terrace, Manningham.
NEWCASTLE : 90, Pilgrim Street.
CARDIFF : Western Mail Chmbs.

How to Run a Miniature Railway System—

(*Continued from page* 293)

the trip-piece will operate the reversing gear again, but in the opposite direction, when the engine reaches it on its backward journey.

In order to make a success of reversing from the track it is necessary for the train to have sufficient momentum for the loco to run quite clear of the trip-piece before changing its direction, so as to allow time to lower the trip-piece and get the track clear.

The method of braking from the track by means of the special rail is similar, except that the alternative trip-piece is used. This actuates another lever projecting from the underside of the loco (B, Fig. 2).

After reversing or braking from the track the loco mechanism may be restored to its original condition by means of the levers in the cab. The Hornby No. 2 Tank Loco mechanism is exactly the same as that of the No. 2 Loco, so it requires no further description.

No. 1 Loco

The Loco in the No. 1 Set has reversing gear and brake, controlled from the cab in the manner already described, the left-hand lever operating the brake and the right-hand lever the reverse. This loco can be braked but not reversed from the track. For the purpose of braking, each No. 1 Hornby Train Set contains a special curved rail fitted with a lever and a trip-piece.

The No. 1 Tank Loco is the same as the No. 1 Loco in construction and operation.

Other Locos

The Zulu Loco is not fitted with reversing gear, but may be braked either from the cab or from the track in the same manner as the foregoing locos. A curved brake rail is supplied with every Zulu Set.

The George V. Set Loco is not reversible but may be braked from the cab. Incidentally, it may be mentioned that this set has curved rails making a circle 1 ft. 6 in. in diameter.

Straight Brake Rails

In addition to the curved braking and reversing rails already mentioned, a straight rail fitted with one lever and trip-piece is also made and sold separately. By means of this rail the No. 2, No. 1 and Zulu Locos may be braked from the track, and the fact that this brake rail is straight is of particular value in bringing the train to a standstill in a station in a realistic manner.

Before any loco is set to work it should have all its gears and bearings oiled thoroughly with good machine-oil, such as that used for sewing machines and typewriters. The bearings on all rolling stock should also be oiled. While doing this it is advisable to see that the trunnions are not bent inwards so that they press against the side of the wheels thus preventing free running. It is also necessary to guard against any oil getting on to the rails, and to prevent this the face of the rails should be occasionally rubbed over with a clean rag.

NEXT MONTH:—

Points and Crossings—a simple layout.

Runaway Engine in Flames

MECCANO BOY INTERVIEWS FIREMAN HERO

A THRILLING incident took place on a London suburban train a few weeks ago when an engine-fireman's brave act saved five hundred City workers from a terrible disaster.

One morning the passengers waiting at Totteridge Station were horrified to see the 8.44 a.m. High Barnet to Broad Street (London) train dash through the station at 50 miles an hour. The engine was enveloped in flames and the driver and fireman were clinging for their lives to the back of the tender, whither they had been driven by the terrific heat. A few seconds later the driver, William Barnett, was thrown from the swaying engine, but luckily he rolled clear of the train as it swept by. He was picked up and taken to hospital suffering from injuries to the head.

George Bowles, the fireman, knowing that certain disaster awaited the train unless it was stopped, climbed back through steam and flames into the cab, and although he was suffering great pain from burns, he succeeded in bringing the train to a standstill, thereby saving many lives.

On the following day I visited Fireman Bowles at his home at Forest Gate, and found him little the worse for his adventure, with the exception of burns on the arms. In fact he made light of the whole affair, although he confessed that he did not want another experience like it!

"At the time of the accident," he said, "our engine (a 4–4–0 tank loco) was running backwards, that is, coal-bunker first. Just outside High Barnet the vibration of the engine must have caused the steam outlet in the smoke box to close, and this shut off the steam-blast that 'draws' the fire. The result was that the back-draught from the smoke-stack to the furnace forced fire and smoke straight into the cab.

"The flames shot up to a height of ten feet, and we were driven back along the tender by the heat and fumes, which became unbearable. We stood on a narrow ledge and clung with our hands to the rail at the top. Meanwhile the engine was completely out of control, and we tore through Totteridge Station at a terrific speed. It was here my mate was thrown off, although I did not see him go as he was on the opposite side.

"As the train flew past Woodside Park Station I realised that it would mean certain disaster if it reached the next station, Finchley, as it would be thrown from the rails at the junction there. Also a train was due on the down line, which in passing was bound to strike me as I hung in my present position. A momentary impulse came over me to jump from the engine, but instead I pulled my cap down over my face and dashed back into the cab. Groping amid the flames I found the regulator, closed it, applied the brakes and the train came to a standstill.

"The passengers, who had scarcely realised the peril they had been in, continued their journey in another train. That is all there is to tell," modestly concluded Fireman Bowles.



Photographed by [*our Representative*

Fireman Geo. Bowles

When I left Mr. Bowles I told him I felt sure all Meccano boys would join me in appreciating his splendid act and in wishing him well.

H.L.

Lives of Famous Engineers—

(*continued from page* 279)

canal, about 600 men in all being employed.

After two years' work 22 miles of the canal had been cut and finished, and 409 yards of the Harecastle tunnel cut and vaulted. Further progress on the tunnel was very slow, however, and it was not until 1777—five years after Brindley's death—that the work was completed. The cutting of the remainder of the canal went forward without any striking incidents and does not call for further mention.

Close of Brindley's Career

Brindley afterwards planned a number of other canals. Some of these he executed himself, but many of them were carried out by others. He was also called upon to give his opinion upon plans prepared by other engineers for various canals, one of the most important of which was the Leeds and Liverpool Canal, 130 miles in length, which brought the manufacturing district of Yorkshire along the valley of the River Aire into communication with Liverpool and the intermediate districts of Lancashire.

Brindley's career was now drawing to a close, for like many other famous engineers, he died at a comparatively early age. His mode of life—long hours of work, irregular meals and exposure to all kinds of weather—gradually undermined his constitution, and one day, while surveying a branch of one of his canals, he caught a chill from which he never recovered. He was ill only a few days, and died on 27th September, 1772, in his 56th year.

A Self-Taught Genius

Brindley was one of the most remarkable of all self-taught engineering geniuses. He could scarcely read and was therefore unable to profit by the recorded experiences of others. The only education he had was the result of his own observation and experience. He tackled his problems as they came along and overcame them by sheer ability, added to great determination. It is curious to learn that, when any specially serious difficulty occurred in the progress of one of his undertakings, he used to go to bed and remain there for two or three days until he had thought out a way of dealing with the trouble!

Brindley's self-confidence and independence are well illustrated by the following story. The King of France, hearing of the remarkable success of his work for the Duke of Bridgewater, desired to see him, and sent a message inviting him to inspect the Grand Canal of Languedoc. Brindley replied: "I will have no journeys to foreign countries unless to be employed in surpassing all that has been already done in them."

NEXT MONTH:—

Telford: His Bridges, Roads and Canals

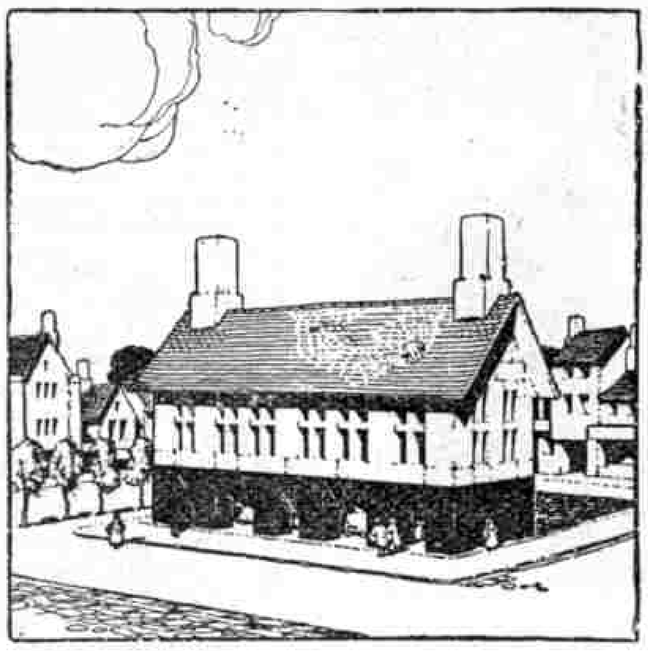
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OF ARTIFICIAL STONE

A DELIGHTFUL BUILDING PASTIME DESIGNED ON AN ENTIRELY NEW PRINCIPLE

With Lott's Bricks you can construct any Buildings required for your Model Railway.

A MARKET HALL
From Boxes 1 and 2 or Box 3 (Series B).



SERIES "B."

Box O	Complete with Plans, Bricks and Roof for	6 Models	2/–
„ A	„ as above, also Trees and Fences,	12 „	5/–
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„ 1	„ „ „ „	18 „	10/–
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GARDEN SETS.
Containing Trees, Fences, Shrubs, Shells, Roofs and Sand.

Box 1 ... Price 4/– Box 2 ... Price 6/–

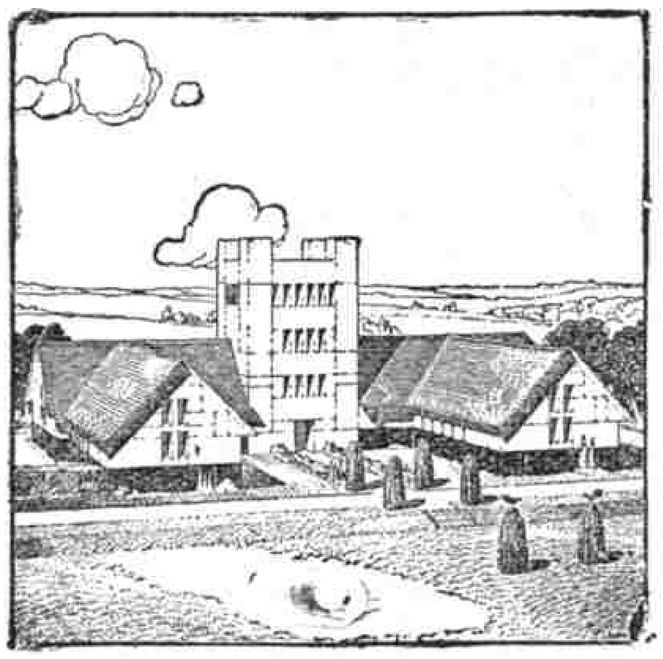
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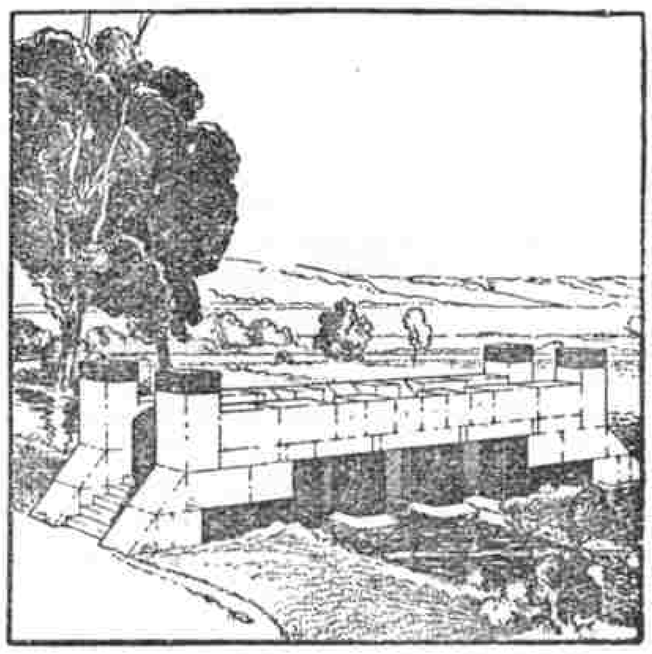
TUDOR BLOCKS

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Box 1	To Build	6 complete Models	3/6
„ 2	„	12 „ „	7/6
„ 3	„	18 „ „	17/6

Set No. 3 is packed in a large well-made wooden box with Lift-out Tray containing a good selection of Trees and White Paling Fences. Other Progressive Boxes in this series now in course of preparation.

BRIDGE
From Box No. 3 (Series B).



LOTT'S BRICKS LTD., WATFORD, England

Enamelling a Bicycle—(*cont. from page* 307)

Now comes the most important part—the application of the third and last coat of enamel. The appearance of the whole work depends on the manner in which this coat is put on. The secret of successful enamelling lies in applying the enamel thinly and evenly, and this result is obtained by taking light and regular strokes with the brush. It is important to remember that too much enamel on the brush will result in the enamel running and spoiling the even surface. Particularly with the third coat even and regular strokes should be used and the enamel applied as lightly as possible. The result, when quite dry, should be a smooth, shining surface, and with care and patience it is not difficult to closely imitate that "straight-from-the-shop" appearance of a new cycle.

Special Methods

For those with sufficient time and patience better finish may be obtained after the third coat has stood for two or three days, by rubbing the frame with a wet flannel dipped in pumice powder. The rubbing should be gently and evenly done and continued until a smooth, dull surface has been obtained. The powder should then be washed off, and the frame dried and painted with a coat of transparent finish, which should be worked-in well and evenly. When quite dry, the job should satisfy even the most discriminating owner.

Sometimes special instructions are issued with certain enamels, and if these differ from those given above they should be carefully followed, as different enamels often require different applications.

NEXT MONTH:—

CYCLE LAMPS

Things Not Always what they Seem!

Novel Fancy Costume constructed with Meccano

WE are continually receiving accounts describing strange uses which our ingenious readers have found for Meccano. We have heard, for instance, that Meccano nuts and bolts make admirable substitutes for buttons and that Meccano strips are ideal for making rabbit-hutches! But we have never before heard of Meccano being used to hold up a pair of legs!

Yet this was the novel idea conceived by Mr. Walter Smith, of Harrogate, the originator of the unique clown costume illustrated on this page. We are sure that all our readers will think that the wearer of this costume must have found it extremely tiring to have to stand on his hands for so long—until they learn the secret of the costume!



In reality, although the costume is upside down, the man inside it is in an ordinary standing position. The clown's chest thus forms the wearer's back and the clown's arms are really the wearer's legs! The comical head is held in the hands of the man inside the costume and can be moved about in a very natural manner. The patch on the trousers is at the same height as the head of the wearer, and it is made of thin gauze so as to enable the wearer to see ahead and also—very necessary!—obtain plenty of air.

The greatest difficulty in carrying out the idea was to find something to support the two dummy legs of the clown in the air. A wooden framework was at first tried, but it proved to be useless on account of its heavy weight and absolute rigidity. Then it was that Meccano came to the rescue, and legs were made of angle girders, etc., and securely strapped to the wearer's shoulders. Here they bent and swayed in a most realistic manner and yet remained quite firm.

We are not surprised to learn that Mr. Smith was awarded the first prize in a local carnival for his clever idea, and no doubt many of our readers will remember this novel costume when next they enter carnival or fancy-dress parade. It is not advisable to wear it at a fancy-dress dance, however, as someone might wish to shake hands, which would be decidedly awkward for all parties!

A Double-Ended Loco—(*cont. from p.* 295)

Garratts Useful at Home

A particularly interesting example of the capabilities of the Garratt locomotive is to be seen at the works of Messrs. Vivian & Sons, Ltd., at Swansea. Here the conditions are very severe as regards loads, gradients and curves, and the ordinary type of loco has been found unequal to the work. A specially-designed Garratt was therefore installed early this year, and has been completely successful. This engine regularly hauls loads of 150 tons up a gradient of 1 in 20, and negotiates curves of 97 ft. radius without the slightest difficulty, maintaining admirably steady running throughout.

Through the courtesy of the makers we are able to reproduce a photograph of this special loco, from which an excellent idea of the Garratt principle may be obtained. The success of this loco is of particular importance as it points to a means of overcoming the many difficulties inseparable from works railways, where often space is limited and conditions generally are far from ideal from a railway point of view.

It is interesting to learn that the London and North Eastern Railway recently took delivery of a Garratt locomotive, and that the London, Midland and Scottish Railway will shortly follow suit.

A Stamp Tour Round the World—

(*Continued from page* 299)

The story of the battle between Generals Montcalm and Wolfe is well known to most of us, for it is an outstanding incident in the history of this great Dominion. Opposite Quebec in the middle of the river is the Isle of Orleans, where James Wolfe, the English general, a young man of thirty-three, was encamped with 7,000 men. Montcalm was in possession of Quebec with a much larger force. Wolfe took his force up the river, however, and climbing the precipitous bank they advanced on the town from the rear. The fight was soon over and Quebec came into the possession of the English, but both Wolfe and Montcalm were killed on the battlefield.

The Niagara Falls

We now travel by aeroplane to Niagara Falls. Following the course of the St. Lawrence river we pass Montreal, and in a few hours' time find ourselves flying over Lake Ontario. This is the first of the five great lakes, and between this lake and Lake Erie the Falls are situated, about 500 miles from Quebec.

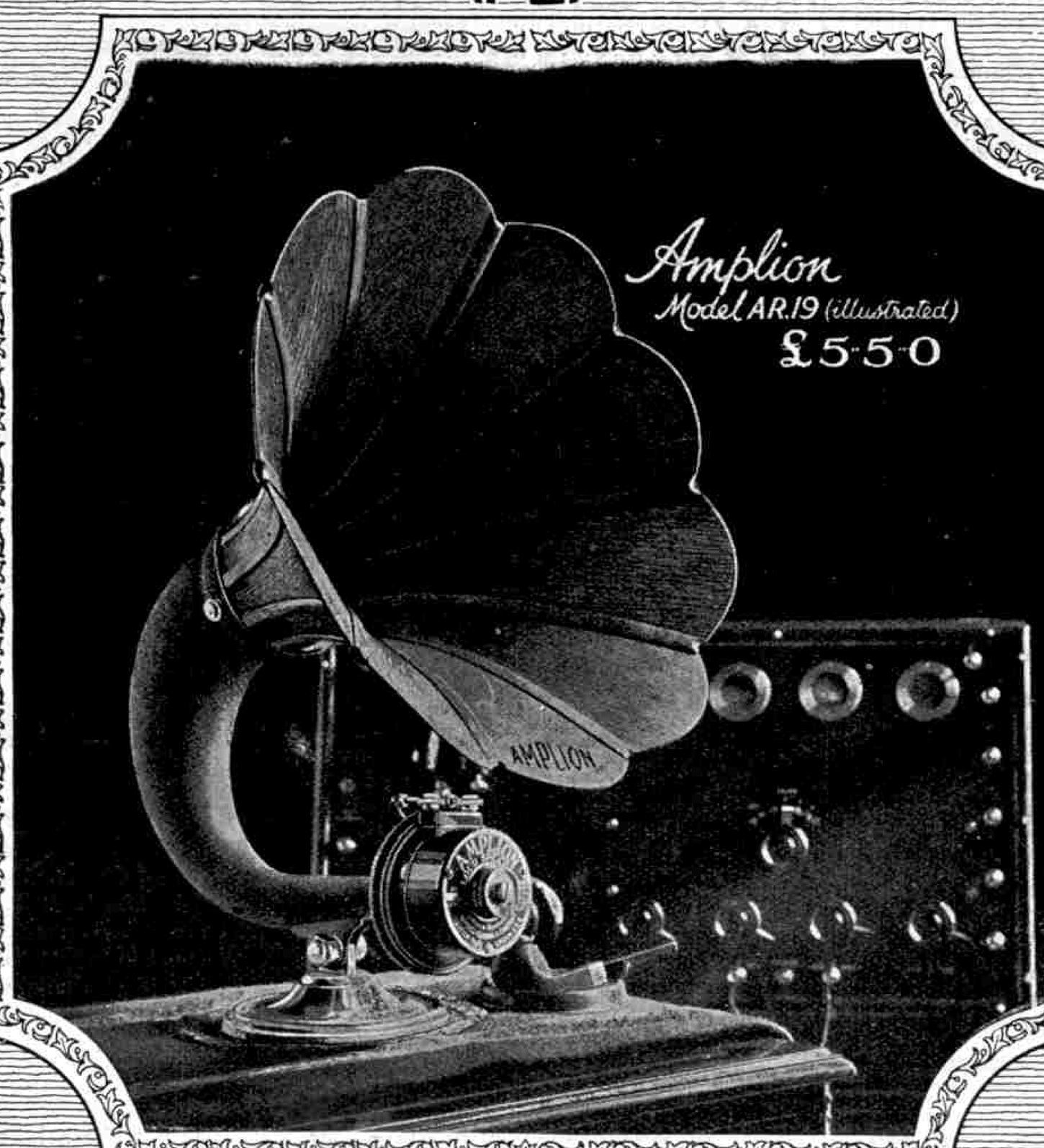
Who can describe the magnificence of this scene? The river St. Lawrence is divided by Goat Island, and here it plunges over a cliff 158 ft. in height. But it is not the height of the fall that makes Niagara unique, it is its breadth and the volume of water that falls over its edge every day. The Horseshoe Fall, as the Canadian half is named on account of its curved shape, is 2,600 ft. in breadth and the American Fall is 1,400 ft. in breadth, bringing the total breadth to more than three-quarters of a mile, over which an average of 220,000 cubic feet of water pass every second! The manner in which some of the enormous energy of this mighty fall is utilised to produce electrical energy on a vast scale is described in our article on Hydro-electric Power Stations on page 280.

The United States have issued two very excellent view stamps showing the Niagara Falls, one being the 5c. value of the 1901 issue, in commemoration of the Pan-American Exhibition at Buffalo. This set really illustrates various ways and means of transport, Niagara Falls being included to show the marvellous bridge that crosses the river a little below the Falls. The second view of the Falls is shown on the 25c. value of the current series which was issued in 1923.

NEXT MONTH:—

UNITED STATES, BERMUDA, etc.

AMPLION



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AMPLION LOUD SPEAKERS are world-famous for sensitivity, full volume, clarity and wonderfully natural tone—qualities due to the incorporation of many exclusive features, including a non-resonating sound conduit with wood horn and an improved unit embodying the "floating" diaphragm.

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ALL BRITISH RADIO EXHIBITION **STANDS 45-46** **ROYAL ALBERT HALL Sept. 27th—Oct. 8th**

MINIATURE BILLIARD TABLES

"The Boy Champion"

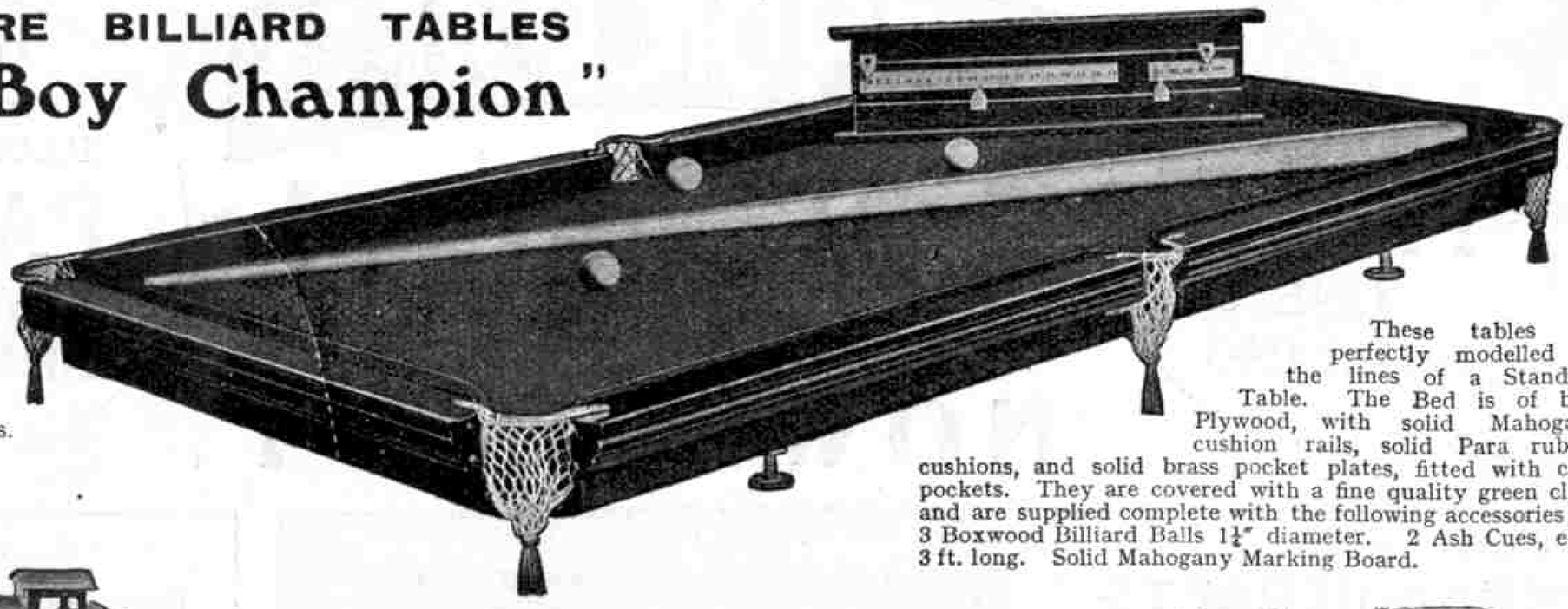
Prices :

3′ 0″ × 18″
35/6

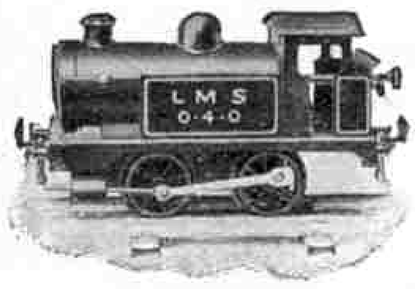
3′ 6″ × 21″
39/6

4′ 0″ × 24″
With Composition Balls.
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All Carriage Paid.



These tables are perfectly modelled on the lines of a Standard Table. The Bed is of best Plywood, with solid Mahogany cushion rails, solid Para rubber cushions, and solid brass pocket plates, fitted with cord pockets. They are covered with a fine quality green cloth and are supplied complete with the following accessories :— 3 Boxwood Billiard Balls 1¼″ diameter. 2 Ash Cues, each 3 ft. long. Solid Mahogany Marking Board.



No. 1 HORNBY TANK LOCO
Fitted with Reversing Gear and Brake. Gauge 0.
Lettered L.M.S. Price **12/6** (postage **6**d.)

The Midland Specialists in Meccano Products



No. 2 HORNBY TANK LOCO
Beautifully finished. Lettered L.M.S. or L.N.E.R. Reversing. Good Clockwork. Gauge 0. Price **30/-** (postage **9**d.)

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We also hold a Complete Stock of all **MECCANO ACCESSORY PARTS**

BARNBYS LTD., Great Western Arcade

(Estd. 1875) **BIRMINGHAM**

A Meccano Boy at Wembley—

(*continued from page* 289)

ceremonies extended for several days, and I can quite understand it after reading that long-drawn-out marriage agreement!

I left India very reluctantly, and as I crossed the big courtyard gleaming white in the sun, and hesitated a moment beside the fountain, I thought what a very beautiful country India must be with her wonderful history, her architecture, perfumes, and carvings.

Proud to be British

I had got it into my head that the British Government Building would be rather "stodgy." Somehow it didn't sound very exciting, and I imagined I should find records and statistics and similarly uninteresting things. When I was inside, however, I found I had made a great mistake and I left it fully believing it to be the most interesting building in the Exhibition!

The door is guarded by six lions, with heads held high, as if they were proud of their British nationality! The whole atmosphere of the place, indeed, was awe-inspiring—as if the spirits of our brave soldiers and sailors, of the great explorers and statesmen of the past, were there beside the relics shown in memory of them, Nowhere in the whole Exhibition did I feel so proud to be British as when I was in this building.

The big hall on the ground floor is hung around with the arms of our Colonies and their flags, and on the floor is a relief map of the world, 40 ft. by 20 ft. The oceans of the earth are represented by real water, across which miniature ships, liners, and merchantmen move continuously. It is fine to see a tiny liner leave Southampton, reach Australia, and turn round and steam home, whilst other ships are speeding at the same time to their respective destinations. The map is lit with electricity from underneath, the British possessions lighting up red one moment, then the coalfields, timber-growing countries or some other feature in another colour, an indicator at the head of the map explaining what each different colouring represents.

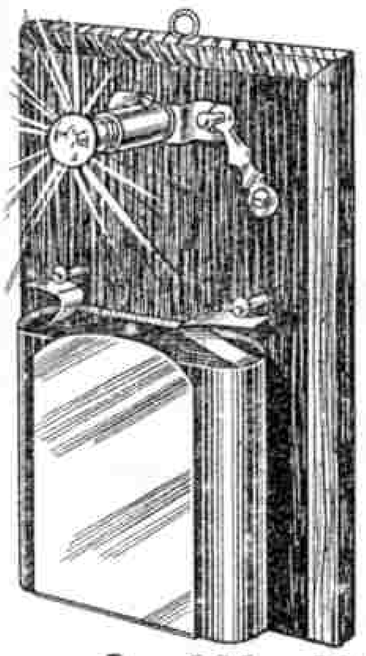
Science v. Disease

In the Science section of the building are two life-like tableaux, one of which can just be seen in the illustration on page 289. The first shows a tropical jungle scene, with long grass and wild undergrowth, the palms sheltering a little native hut in which a white man is lying haggard and ill. He is covered with a dirty scrap of native blanket and watches a native preparing a kind of porridge over a smoky wood fire. Flies and insects are innumerable and the country round about is swampy and full of fever, while snakes and wild animals abound in the jungle.

The second tableau shows what science has accomplished on this same piece of ground. The man is standing, well and strong, having cleared and drained the land, which is now being cultivated and made profitable. Fruit trees shade the neat little bungalow he has built, and the place is so healthy that even the man's wife may live here safely. All food and milk is protected from flies and insects by muslin covers, and the open verandah is covered with a mosquito-net.

(*To be continued*)

TO INTRODUCE our Famous
"BEAM" LIGHTING SETS
2/6



to readers of the "Meccano Magazine," we will give FREE, A SPARE REFILL with the first 50 orders. This Lighting Set, which can be used as a Bedroom, Corridor, or Cupboard Light, is fitted with special **Luminous Switch** (which can be seen at once in the dark) and is complete with best quality battery and powerful bulb. Only **2/6** post free. Send now and be in the first 50.

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BOND'S LATEST MODEL
FIRE PAILS for Model Railway Stations.



Scale, Gauge "O"

Buckets, 2½d.
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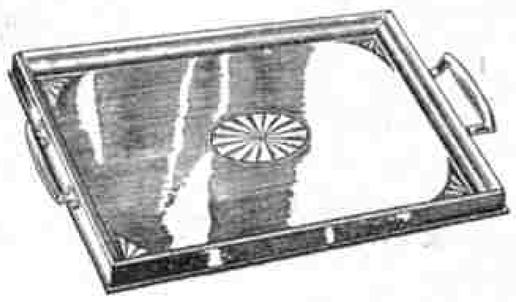
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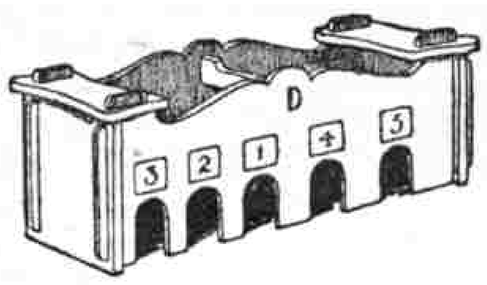
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"HANDICRAFTS ANNUAL"

tells you how to make numerous woodwork articles including the following subjects :



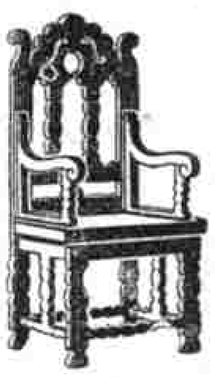
TRAY MAKING. This article explains how boys can make tea trays and coffee trays for their own home.



MARBLE BRIDGE BOARD. Full-size diagrams are given for making this marble game in wood.



GRAMOPHONE. A large supplement sheet is given with the ANNUAL to enable older Meccano boys to make this Cabinet. Full instructions are given.



TOY MAKING. There are numerous illustrated articles on making a wide variety of woodwork toys.

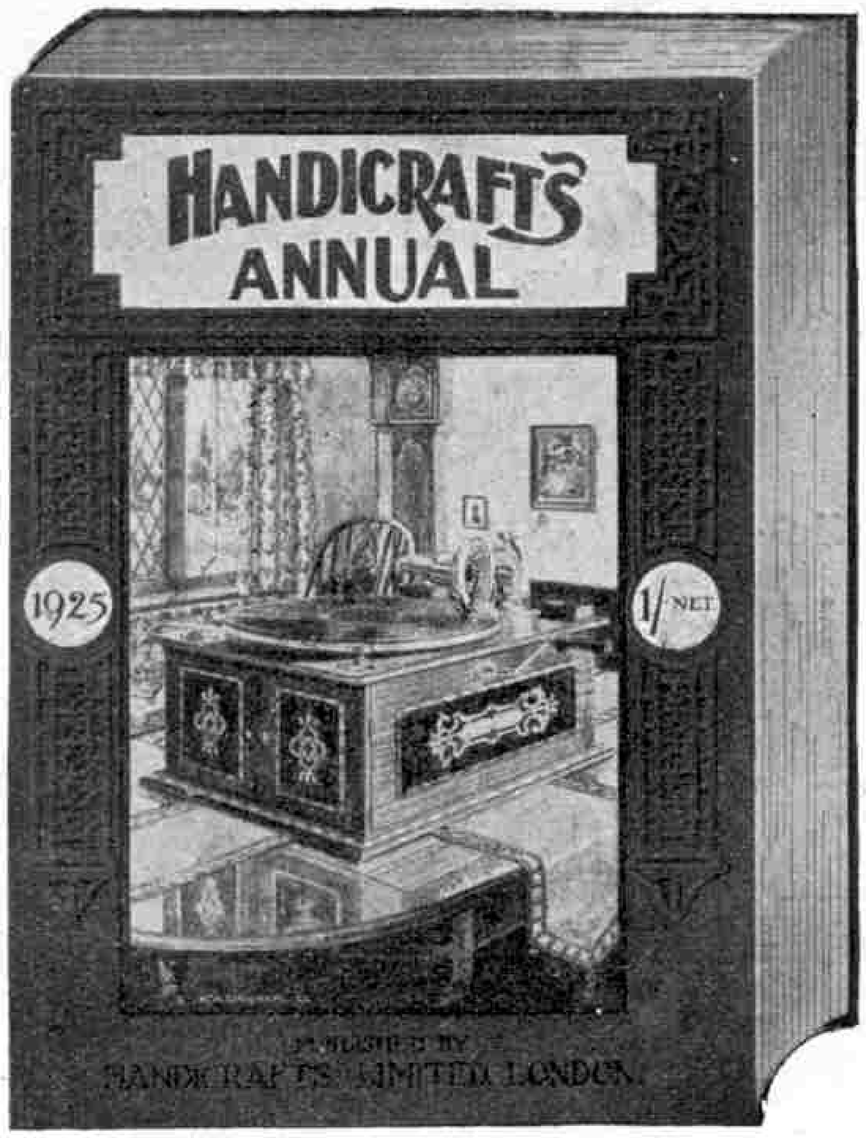


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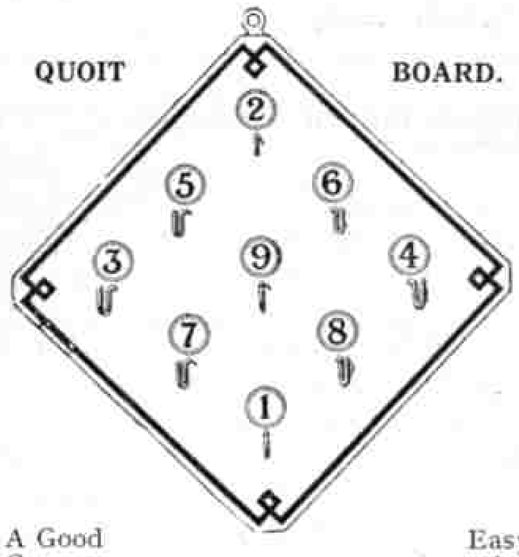
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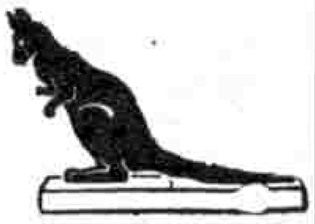


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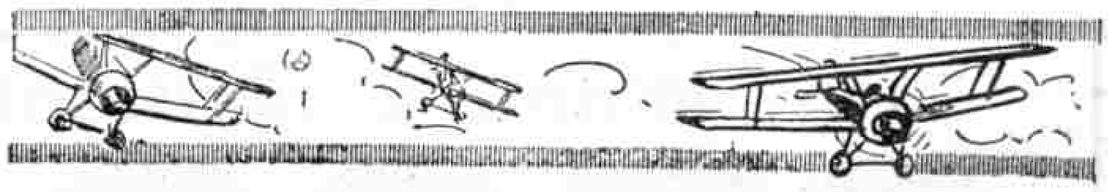
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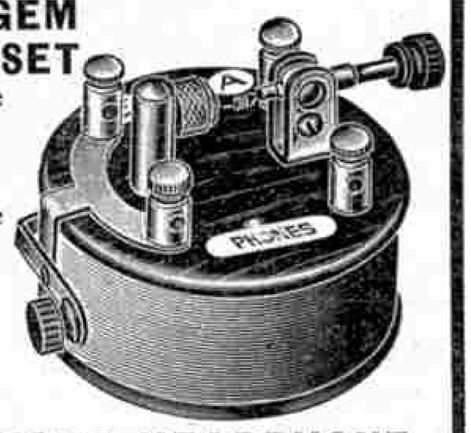
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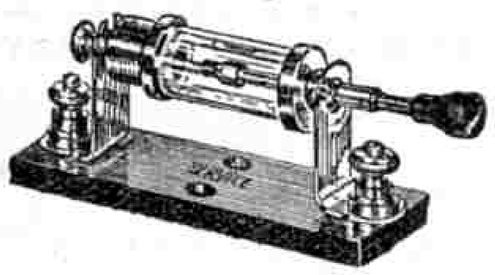
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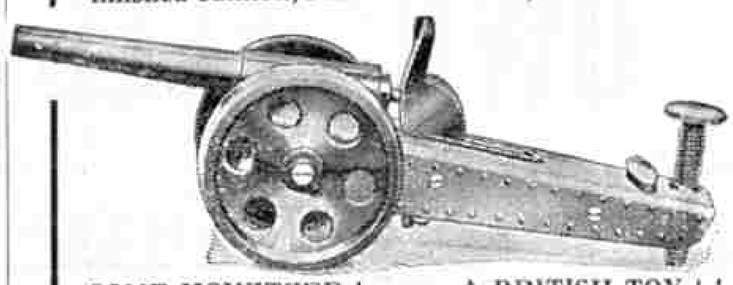
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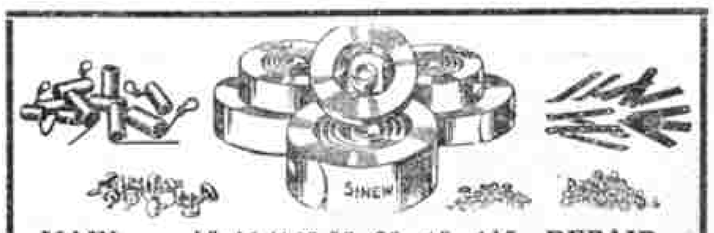
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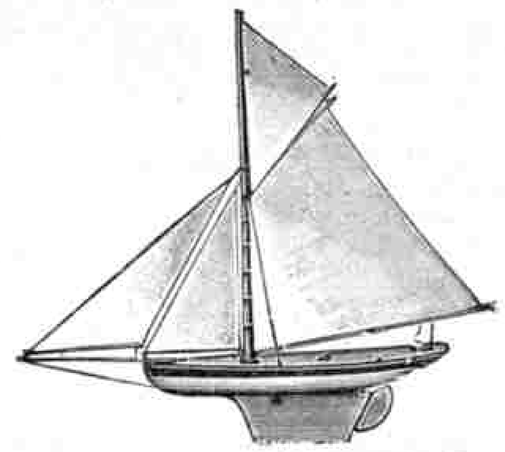
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MECCANO MAGAZINE

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EDITORIAL AND ADVERTISING OFFICES:—
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Telegrams: "Meccano, Liverpool."

Publication Date. The "*M.M.*" is published on the 1st of each month and may be ordered from any Meccano dealer, or from any bookstall or newsagent, price 2d. per copy. It will be mailed direct from this office, 1/6 for six issues and 3/– for twelve issues (post free).

Advertisements

Readers' Sales and Wants. Private advertisements (*i.e.*, not trade) are charged 1d. per word, minimum 1/–. Cash with order. Editorial and Advertising matters should not be dealt with in the same letter.

Small Advertisements. 1/– per line (average seven words to the line), or 10/– per inch (average 12 lines to the inch). Cash with order.

Display. Quotations for space bookings, and latest circulation figures, will be sent on request.

Press Day, etc. Copy must be received not later than 10th of each month for publication in following issue. Half-tone blocks up to 100 screen.

Remittances. Postal Orders and Cheques must be made payable to Meccano Ltd.

Obtaining the "*M.M.*" Overseas

Readers Overseas and in foreign countries may order the *Meccano Magazine* from regular Meccano dealers, or direct from this office. The "*M.M.*" is sold Overseas at 2d. per copy, or mailed (post free) direct from Liverpool, 1/6 for six issues, or 3/– for twelve issues.

IMPORTANT.

Overseas readers are reminded that the prices shown throughout the "*M.M.*" are those relating to the home market. Current Overseas Price Lists of Meccano Products will be mailed free on request to any of the undermentioned agencies. Prices of other goods advertised may be obtained direct from the firms concerned.

CANADA: Meccano Ltd., 45, Colborne Street, Toronto.

AUSTRALIA: Messrs. E. G. Page & Co., 379, Kent Street, Sydney.

NEW ZEALAND: Messrs. Browning Ifwersen Ltd., P.O. Box 129, Auckland.

SOUTH AFRICA: Mr. A. E. Harris (P.O. Box 1199), Textile House, Von Brandis St., Johannesburg.

HOW TO BE TALLER
TALL, GRACEFUL. She or he gets attention, respect and admiration. You can be 2, 3, or more inches taller. Surprise your friends. Send only 1½d. stamp.
M. M. Edison, 51, Church Street, South Shore, Blackpool.

MAKE YOUR OWN ELECTRIC LIGHT

5/– Every "Meccano" reader who is interested in Electricity or who one day wants to be an Electrical Engineer should get one of these wonderful Dynamos and learn how Electricity is made. They are easy to work. Will light



brilliantly 4–6 volt lamps and are backed by Green's many years' experience. Send now! Delivery by return. **Dynamo 5/–.** Post, etc., 6d.
GREENS (Dept. N), 85, New Oxford Street, London. **5/–**

CUT THIS OUT. 'Meccano' Pen Coupon, Value **3d.**
Send 5 of these coupons with only 2/9 direct to the **Fleet Pen Co., Fleet Street, E.C.4.** You will receive by return a splendid British 14-ct. Gold Nibbed Fleet Fountain Pen value 10/6 (Fine, Medium, or Broad Nib). If only 1 coupon is sent the price is 3/9. 3d. less for each extra coupon up to 4 (Pocket Clip 4d.). Satisfaction guaranteed. Your own name gilt letters, either pen 1/– extra.
Lever Self-Filling Model with Safety Cap, 2/– extra.

MAKE YOUR OWN METAL TOYS
Our Casting Moulds produce thousands of quick-selling toys such as Lead Soldiers, Cowboys, Indians, Trees, Animals, Birds, Ships, Sailors, Railway Station Staff, etc., without previous experience. Complete Mould 2/6. Illustrated Catalogue, stamp.

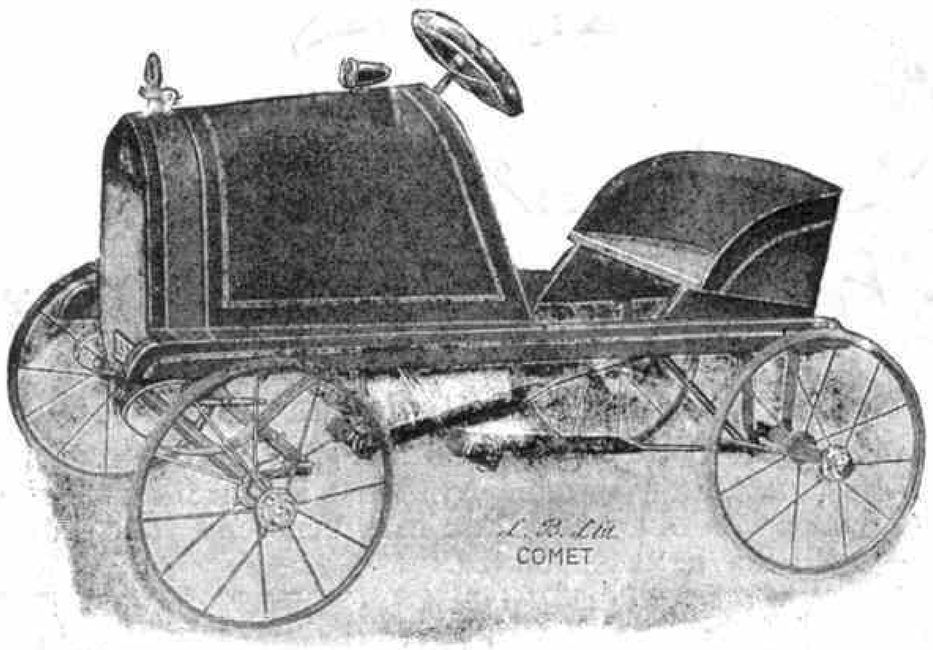


A. RODWAYS, 102, Long Street, BIRMINGHAM.
Mention "Meccano Magazine."

SKIDS FOOTBALL: RESULT
RED ROVERS 1 Goal. BLUE BELLS 0 Goals
"Both teams played exceedingly well. The placing was splendid, showing intelligence and skill."
Order your team to-day. It is a game of real skill. A chum and a table are all you require. Team set (11 a side) 2/6, League set (11 a side) 10/6. Also **Skids Cricket,** 3/6, post paid. Foreign postage 1/– extra. Of dealers, or from **Skids Games (M. Dept.), 61, Cathedral St., Glasgow.**

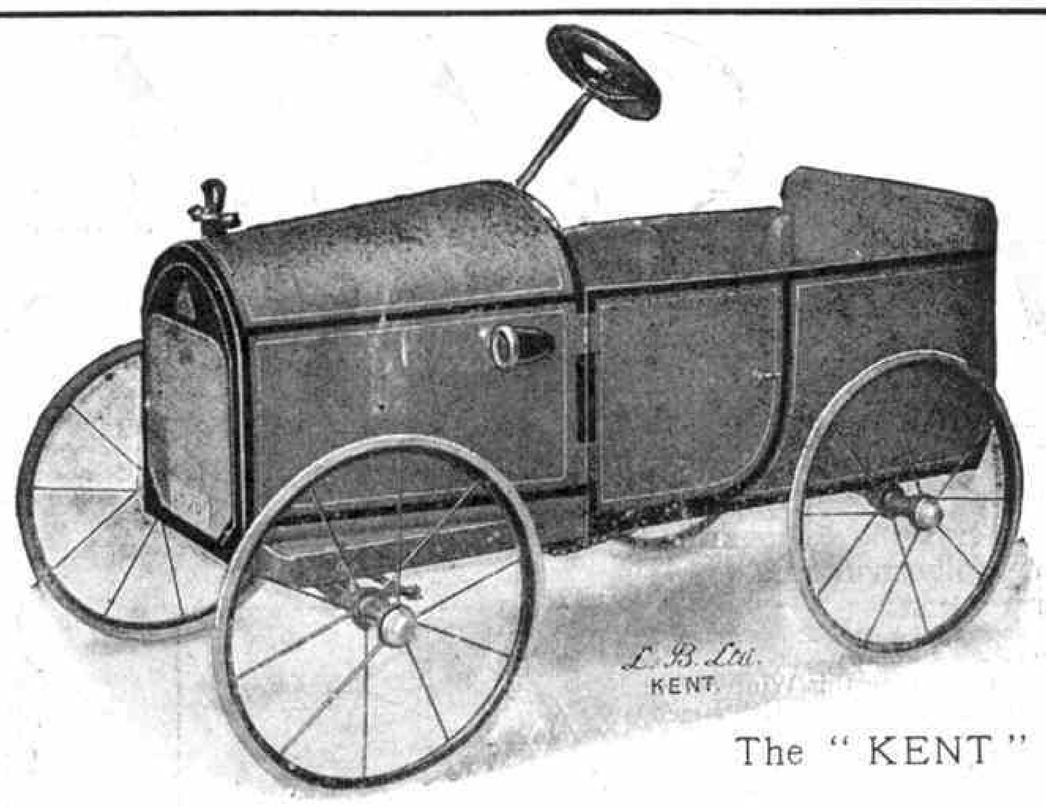
RECORD BREAKING!

Photographs of some of our Record-breaking Low Price Models at the British Empire Exhibition



The "COMET"

A very natty Auto for the speed merchant. It has a double crank movement, 10" wired-on tyred wheels, lamp, etc. For ages 2–7 years. **27/-**

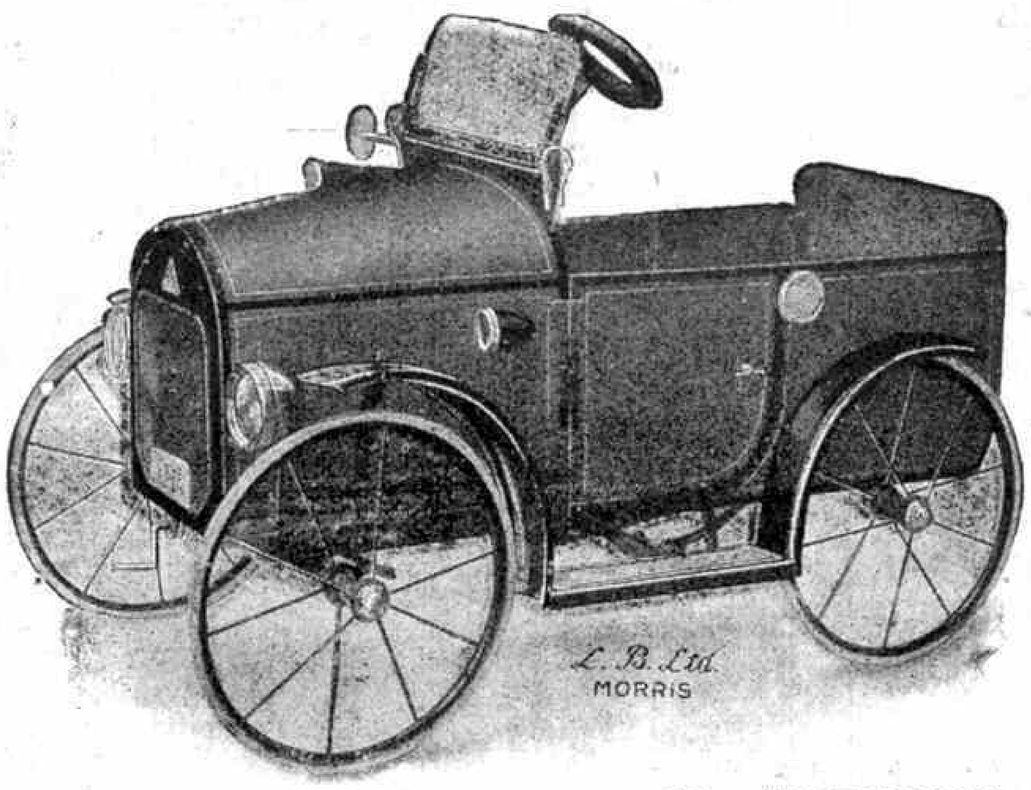


The "KENT"

This smart little Runabout is fitted with a door, 2 side lamps, 12" wired-on tyred wheels. **49/6**

ASK DADDY TO LET YOU HAVE A CAR OF YOUR OWN

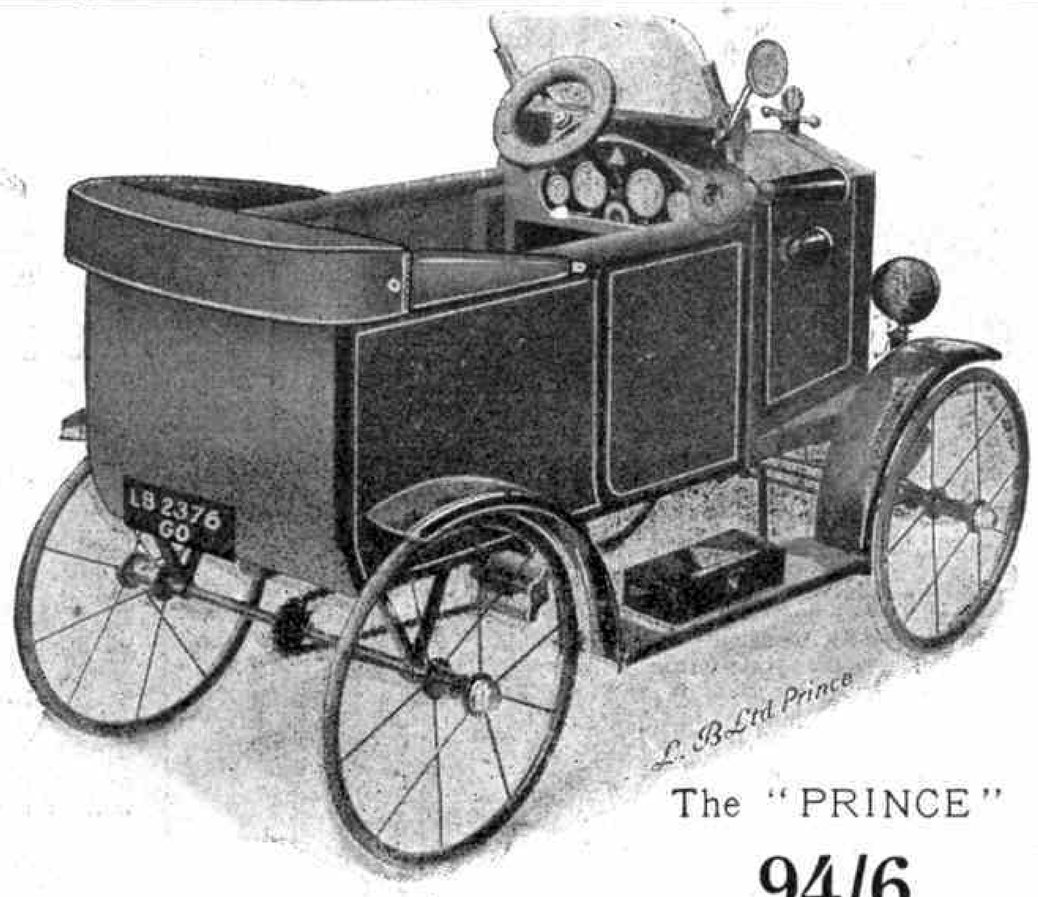
OBTAINABLE AT ALL GOOD TOY SHOPS



The "MORRIS"

78/9

The "MORRIS" is fully equipped with mudguards and adjustable windscreen, 2 head and 2 side lamps, bulb horn and driving mirror, licence plate, etc., 12" wired-on tyred wheels. Children up to 8 years.



The "PRINCE"

94/6

This luxurious model with the Rolls-Royce type radiator has everything the heart can desire, including instrument board with clock, speedometer, oil indicator, voltmeter and switch, dummy hood and tool box, etc., 12" wired-on tyred wheels. Children up to 10 years.

Always insist on seeing the celebrated Red and Black Triangle Trade Mark on all Toys. It is a guarantee of Quality and Value and of British Manufacture.

Wholesale only from

LINES BROS. LTD., 9, Fore St., London, E.C.

Gamages Special Attractions for Boys

SCOUTING
No Scout should miss seeing Gamages Display of Kit—Musical Instruments, Camping Needs, Uniforms, Tents—everything, all in great variety and all of the best.

WIRELESS
Gamages Wireless Sets and Parts are recognised by all as giving the best results—visit our Dept.—FREE listening-in every day. Write for Wireless Catalogue.

ILLUSTRATED SPORTS LIST
Here is a book that no boy should be without. It deals extensively with EVERY Winter Sport and will be sent **POST FREE ON REQUEST**

THE ZOO
Here there are all kinds of Birds, Monkeys, Mice, Puppies—in fact practically every animal that boys like for their pets. Just come and see them! There's a splendid variety.

FOOTBALL
For your Football Kit, Balls and Accessories, you cannot do better than come to Gamages, the largest Sports House in the World. All Kit of the best, and at London's lowest prices.

GAMAGES

The Great Boys' Shop at Holborn

There's so much to interest you boys at Gamages that it would seem almost folly to go elsewhere for your needs. No matter what the time of year, Gamages have everything to make it a jolly time. Pay a visit to this Great Holborn Store.

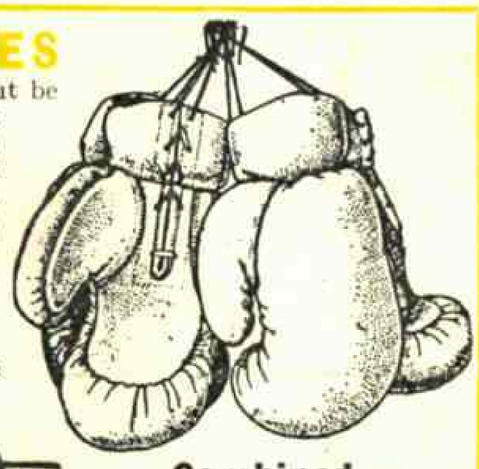
See for yourselves the splendid things on show at Gamages. But if a personal visit is impossible, write for a catalogue (mentioning in what you are interested) and we will send you one free. You can then send your order by post—you'll not be disappointed.

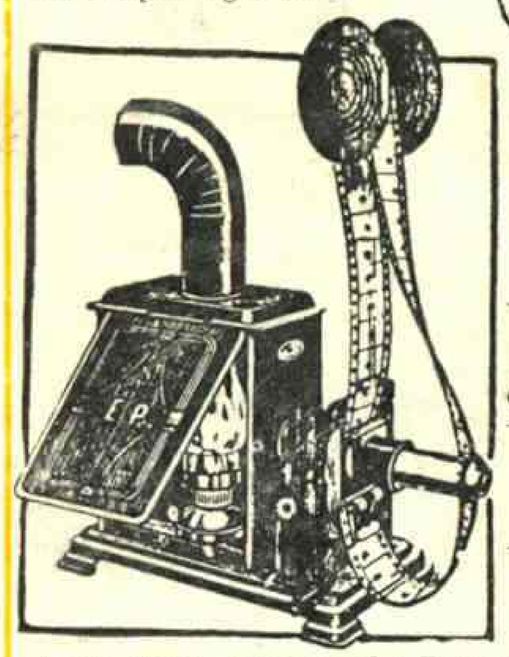
BOXING GLOVES

Take up Boxing this Winter—but be sure your gloves are right—get them at Gamages. Boys' Tan Cape Gloves with laced palms and bar grip. Stuffed horsehair.
Boys' Size, per set **13/6** Post 6d.

Youths' Size, per set **14/6** Post 6d.

Get a Set and start this fine British Sport right away.





Combined Cinematograph and Magic Lantern
Juvenile Model

Reliable Mechanism, with flywheel suitable for all standard size films.

Height including Chimney	Supplied with Films	Supplied with Slides	Prices with Oil Lamp
7 ins.	1	1	*5/6
11 ins.	1	1	*7/6
13 ins.	3	6	21/-

*Post 9d.

13 in. Model fitted for Electric Light **25/6**

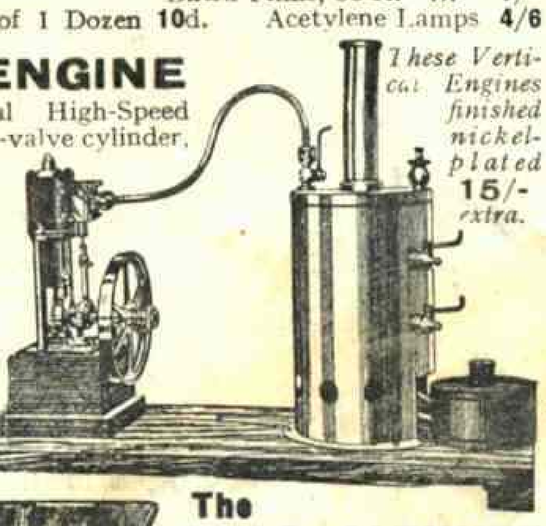
Extra Films, 36 ft. ... 1/-

Extra Slides, per box of 1 Dozen 10d. Acetylene Lamps 4/6

VERTICAL ENGINE

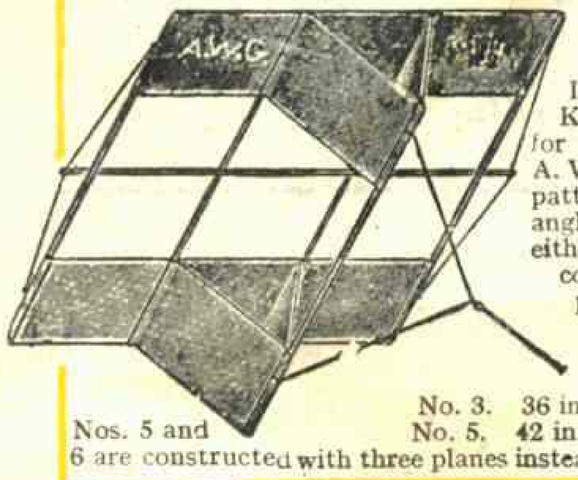
The "Referee" Vertical High-Speed Engine, double-action slide-valve cylinder, trunk guide steel connecting rod and crank shaft. Disc crank, fitted bright vertical brass boiler and spirit lamp. The whole mounted on wooden base. ½" bore and stroke. Price **51/6**

Larger Models up to 1" bore and stroke up to **84/-**



These Vertical Engines finished nickel-plated **15/-** *extra.*

The A.W.G. ALTIKITE



It's great fun flying Gamage Kites, boys—get one and see for yourself. Illustrated is the A. W. G. Altikite, a kite of new pattern, remarkable for the high angle and stability of its flight in either high or low winds. In construction, finish, and performance, a real advance in kite design. **4/-**

No 1. 30 in. **4/-**
No. 2. 33 in. **6/-**
No. 3. 36 in. **8/-** No. 4. 39 in. **10/-**
No. 5. 42 in. **20/-** No. 6. 48 in. **25/-**

Nos. 5 and 6 are constructed with three planes instead of two and are wire braced.



FOOTBALL!

Those of our readers who play football should on no account buy their kit before seeing Gamage Kit and comparing prices. Jerseys, Knickers, Stockings, Boots, Balls, Goal Nets and Posts—you'll find them all in Gamages New

Illustrated Football CATALOGUE

This splendid book (complete with coloured plates) will be sent free to any reader of this Magazine—write for your copy to-day.

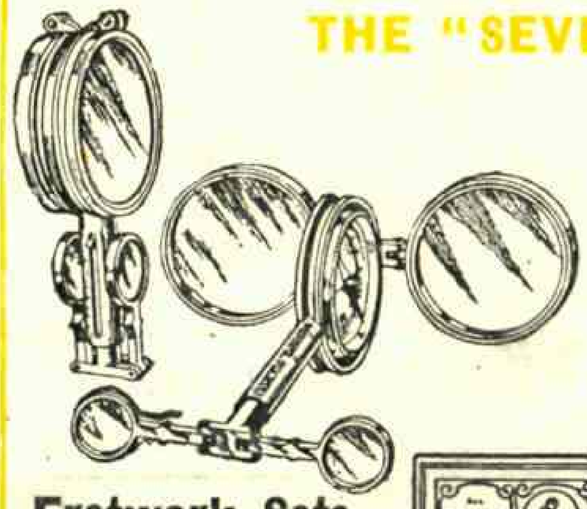


The 'Club' Football

A moderate priced ball of real good quality. Selected Hide Case, hand sewn, and fitted with best quality red rubber bladder. **16/6** Post 6d.

Other Balls from 8/-

THE "SEVEN-IN-ONE"



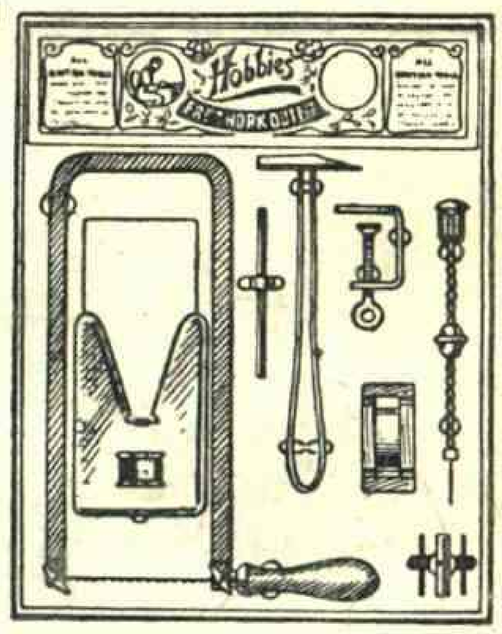
Field or Opera Glass, Compass, Mirror, Reading Glass, Pocket Magnifying Glass (making simple microscope), Sunburner and Diminishing Glass for Sketching, etc. All mounted in superior quality ivorine frame. Price **1/=**

Fretwork Sets

I.72/2 contains 12 in. Frame, Hammer, Steel Rule, Sandpapering Block, Half Dozen Saw Blades, Bradawl and Design. Price **5/6** Post 9d.

I.72/2½ contains 12 in. Frame, Archimedean Drill, with Bit and Nickelled Drill Box, Steel Cutting Table, Iron Cramp, Half Dozen Saw Blades, Sandpapering Block and Design. Price **6/6** Post 9d.

Other Sets from **4/-** to **16/6**





CHEMISTRY!

Why not get a Chemistry Set at Gamages and start experimenting now? Neat Box of Chemicals with instructions, etc., complete for performing 50 experiments. Price **3/3** Post 6d.

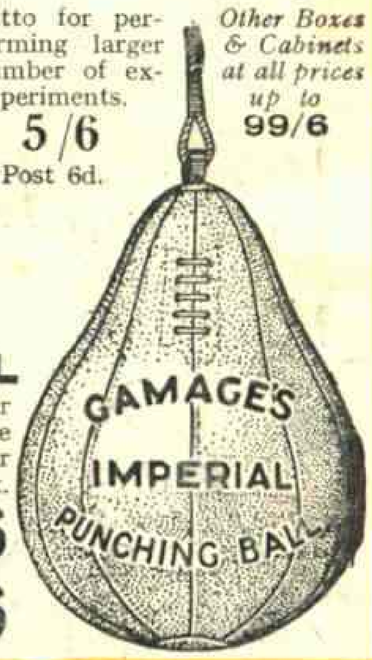
Ditto for performing larger number of experiments. **5/6** Post 6d.

Other Boxes & Cabinets at all prices up to **99/6**

GET A PUNCH BALL

And keep yourself fit during the Winter months. Get one at the Club, too. Here is the "Imperial" Punch Ball, pear shaped, and made expressly for fast work. In Buff Leather, complete with cord. Price **14/6** Post 9d.

Floor and Ceiling Punch Balls, Sheepskin cases and rubber seams. From **9/6**



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Also at BENETFINKS, CHEAPSIDE, E.C.2.

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